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FULL-SCALE INCINERATION SYSTEM DEMONSTRATION AT THE NAVAL BATTALION CONSTRUCTION CENTER, GULFPORT, MISSISSIPPI - VOL VII: PROJECT MANAGEMENT/SITE SERVICES

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This technical report is divided into eight volumes. This portion of the report comprises Volume VII, Project Management/Site Services. The overall goal of the Full-Scale Incineration System Demonstration Project was to determine the reliability and cost effectiveness of a 100 ton/day rotary kiln incinerator in processing soil contaminated with dioxins and other hazardous constituents of Herbicide Orange. This volume summarizes the daily activities during operations at the Naval Construction Battalion Center and the Idaho National Engineering Laboratory (INEL) project management oversight. It discusses the INEL Project Management Plan, the operations contract with Environmental Services of Little Rock, Arkansas, the major management tasks, field operations, and miscellaneous site services. A conclusion and recommendation section is included that lists key items to consider when providing project management and site services for a similar project.

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EXECUTIVE SUMMARY

The Naval Construction Battalion Center (NCBC) Demonstration Project was conducted as part of the research, test, and evaluation phase of the U.S. Air Force Environmental Restoration Program sponsored by the Air Force Engineering and Services Center (AFESC). The overall goal of the project was to determine the cost and effectiveness of a 100 ton/day rotary kiln incinerator in processing soil contaminated with dioxins and other hazardous constituents of Herbicide Orange (HO).

The demonstration program consisted of three phases. The first phase, the Verification Test Burn, demonstrated the effectiveness of the 100 ton/day incinerator to destroy soil contaminated with constituents of HO, in particular 2,3,7,8-tetrachlorinated dibenzo dioxin (2,3,7,8-TCDD).

The second phase demonstrated the ability of the incinerator to meet the requirements of the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, which specifies that the incinerator must meet or exceed a Destruction and Removal Efficiency of 99.9999%.

The third phase determined the cost and reliability of using the incineration on a long-term basis.

This report summarizes the daily activities during operations at the NCBC and the Idaho National Engineering Laboratory (INEL) project management oversight. Specifically, the report discusses the INEL Project Management Plan, the operations contract with Environmental Services of Little Rock, Arkansas, the major management tasks, field operations, and finally miscellaneous site services.

A conclusion and recommendation section is included that lists key items to consider when providing project management and site services for a similar project.

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PREFACE

This report was prepared by EG&G Idaho, Inc., P. O. Box 1625, Idaho Falls, ID 83415, under Job Order Number (JON) 2103 9027, for the Air Force Engineering and Services Center, Engineering and Services Laboratory, Tyndall Air Force Base, Florida 32403-6001.

This report summarizes work done between September 1989 and February 1989 Major Terry Stoddart and Major Michael L. Shelley were the AFESC/RDVS Project Officers.

This report has been reviewed by the Public Affairs Office (PA) and is releasable to the general public, including foreign nationals.

This report has been reviewed and is approved for publication.

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LIST OF ABBREVIATIONS

AFESC	Air Force Engineering and Services Center
BOF	bottom-of-hole
CPFF	cost-plus fixed-fee
DOD	Department of Defense
ENSCO	Environmental Services Company
EPA	Environmental Protection Agency
HO	Herbicide Orange
INEL	Idaho National Engineering Laboratory
NCBC	Naval Construction Battalion Center
PMP	Project Management Plan
POHC	principal hazardous organic constituent
ppb	parts per billion
ppm	parts per million
PUF	polyurethane form
RCRA	Resource Conservation and Recovery Act
RD&D	Research, Development, and Demonstration
rpm	revolutions per minute
SCC	Secondary Combustion Chamber
TCDD	tetrachlorodibenzodioxin
TCDF	tetrachlorodibenzofuran
WBS	work breakdown structure
2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,3,7,8-TCDD	2,3,7,8-tetrachlorinated dibenzo dioxin

SECTION I
INTRODUCTION

A. OBJECTIVE

The purpose of the Naval Construction Battalion Center (NCBC) Demonstration Project was to demonstrate the reliability and cost effectiveness of a mobile rotary kiln incinerator in the soil treatment and site restoration of a Herbicide Orange (HO) contaminated site. The mobile waste incineration system, Model MWP-2000, manufactured and operated by Environmental Services Company (ENSCO) of Little Rock, Arkansas, was selected for this Air Force Full-Scale Incineration Demonstration. The former HO storage site at the NCBC in Gulfport, Mississippi, was the selected location.

The specific goal of this technology demonstration was to reduce the total isomers of tetra-, penta-, and hexachlorodibenzo-p-dioxin and respective isomers of polychlorodibenzofuran to less than 1 part per billion (ppb). The overall soil treatment goal was to reduce the contaminants to criteria approved by Environmental Protection Agency (EPA) Headquarters, which would facilitate the removal of soil from the direct regulation of the Resource Conservation and Recovery Act (RCRA) of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984.

The effectiveness of the demonstration was monitored in terms of cost, equipment availability, equipment maintainability, schedule, and the ability to satisfy the current regulations in terms of total site remediation.

B. BACKGROUND

1. Air Force Use of Herbicide Orange

HO is primarily composed of two compounds, 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), and various esters of these two compounds. HO was sprayed as a defoliant in Vietnam during the 1960s. The NCBC served as an interim storage site (6 to 18 months) for drums destined for Southeast Asia until 1970.

In April 1970, the Secretaries of Agriculture; Health, Education, and Welfare; and Interior jointly announced the suspension of certain uses of 2,4,5-T. This suspension resulted from published studies indicating that 2,4,5-T was a teratogen. Subsequent studies revealed that the teratogenic effects resulted from a toxic contaminant in the 2,4,5-T identified as 2,3,7,8-tetrachlorodibenzodioxin (TCDD). Subsequently, the Department of Defense (DOD) suspended the use of HO, which contained 2,4,5-T. At the time of suspension, the Air Force had an inventory of 1.37 million gallons of HO in South Vietnam and 850,000 gallons at the NCBC. In September 1971, the DOD directed that the HO in South Vietnam be returned to the United States and that the entire 2.22 million gallons be disposed of in an environmentally safe and efficient manner. The 1.37 million gallons were moved to Johnston Island in the Central Pacific in April 1972. The average concentration of dioxin in the HO was about 2 parts per million (ppm), with the total amount of TCDD in the entire HO stock estimated at 44.1 pounds.

Various disposal techniques for HO were investigated from 1971 to 1974. Of those techniques investigated, only high-temperature incineration was sufficiently developed to warrant further investigation. Therefore, during the summer of 1977, the Air Force disposed of 2.22 million gallons of HO by high-temperature incineration at sea. This operation, Project PACER HO, was accomplished under stringent EPA ocean-dumping permit requirements.

During storage and handling at the storage sites, some of the HO was spilled onto the surrounding soil. The soil was therefore contaminated with dioxin as well as the 2,4-D and 2,4,5-T components. Prior to this project, the dioxin contamination on the site ranged from nondetectable to over 640 ppb; the average concentration was estimated at 20 ppb.

2. Overview of Soil Decontamination Program

The Air Force plan for disposal of the bulk quantities of HO and the EPA permits for the disposal of the herbicide committed the Air Force to a follow up storage site reclamation and environmental monitoring program. The major objectives of that required program were to:

a. Determine the magnitude of herbicide, TCDD, and tetrachlorodibenzofuran (TCDF) contamination in and around the former HO storage and test sites.

b. Determine the rate of natural degradation for the phenoxy herbicides (2,4-D and 2,4,5-T), their phenolic degradation products, and TCDD and TCDF in soils of the storage and test sites.

c. Monitor for potential movement of residues from the storage and test sites into adjacent water, sediments, and biological organisms.

d. Recommend managerial techniques for minimizing any impact of the herbicides and dioxin residues on the environment and human population near the storage and test sites.

Immediately following the at sea incineration in 1977, the Air Force Occupational and Environmental Health Laboratory, which is responsible for routine environmental monitoring, initiated site monitoring studies of chemical residues in soil, silt, water, and biological organisms associated with the former HO storage sites at NCBC and Johnston Island.

To accomplish the goals of returning the former HO storage site to full and beneficial use, the Air Force used the technical capabilities of the Department of Energy's (DOE) Idaho National Engineering Laboratory (INEL) and, in particular, EG&G Idaho, Inc., a DOE contractor.

In 1985, the Air Force and EG&G Idaho coordinated a site characterization study (Reference 1). The Air Force and EG&G Idaho continued the remediation investigation by coordinating two small-scale projects to demonstrate the feasibility of two different technologies for the removal of dioxin from HO contaminated soil. Although those demonstrations were successful, the technologies were not sufficiently developed to use for full-scale site remediation. When the small-scale projects were completed, the Air Force still had little data to predict the cost and feasibility of remediating large quantities of contaminated soil. The Air Force, in coordination with EG&G Idaho, proceeded to demonstrate a full-scale

demonstration project in which cost and reliability data would be collected during site remediation.

Rotary kiln incineration was chosen as the technology most likely to be cost effective and reliable. Bids were solicited from a variety of incinerator contractors. Bid evaluation resulted in choosing ENSCO as the incinerator contractor. While ENSCO provided the equipment and operational personnel for the incinerator and soil excavation, EG&G Idaho provided the expertise in overall project management, EPA permitting, and regulatory compliance. Versar, Inc., provided sampling assistance. IT Analytical Services, Twin Cities Testing, and U.S. Testing provided analytical support.

The full-scale Research, Development, and Demonstration (RD&D) project began in September 1986 when the incinerator was assembled on site. A Verification Test Burn conducted in December 1986 successfully demonstrated that the incinerator produced no hazardous effluents. In May 1987, a RCRA Trial Burn successfully demonstrated that the incinerator could achieve the required 99.9999 ("six nines") percent Destruction and Removal Efficiency. Operational testing and site remediation began when EPA Region IV issued the final RD&D permit 23 November 1987. Testing and remediation continued until 19 November 1988 when the last contaminated soil was processed. The incinerator was decontaminated, disassembled, and removed from the site in February 1989.

3. History of the NCBC Site

The former HO storage site is located at the northern end of the NCBC at Gulfport, Mississippi. In the 1940s, the site was designated as a heavy equipment storage area. To accommodate that function, the soil was tilled and mixed with portland cement. The natural precipitation and subsequent drying left a 6 to 10-inch hard-pan layer of cement-stabilized soil.

The boundaries of the former HO storage site were determined through an extensive investigation using aerial photographs, personal interviews, and shipping documents. Based on that data, an extensive sampling and analysis program was developed.

Figure 1 shows the former HO storage area, which was divided into three major sections separated by railroad tracks. Each area was subdivided into 20- by 20-foot plots and sampled for 2,3,7,8-TCDD.

Area A was used for long-term storage of HO from 1970-77. Areas B and C were used in the 1960s for short-term storage of HO awaiting shipment to Southeast Asia. The average length of time that a drum of HO remained at the NCBC was approximately 9 months. Contamination of Areas B and C resulted from spillage during handling of the stored HO drums. Because the drums remained in those areas for only a relatively short time, the spread of contamination was less significant than in Area A. The contaminant migration followed a pattern of decreasing concentration toward the drainage ditches, which lie at the center of the areas. This is because the drums were stored on the rows near Holtman and Greenwood Avenues in Area B and near Holtman Avenue in Area C. The natural gradient of the site is from those rows towards the drainage ditches.

The total area actually used for HO storage was approximately 16 acres. Because of the storage pattern, however, all of areas A, B, and C were left unusable; those areas comprise approximately 31 acres.

Because of the cement-stabilized soil and dioxins strong affinity to soil, the TCDD/TCDF contamination tended to remain close to the surface and did not penetrate deeply into the underlying soil.

4. Characterization of the NCBC Site

In the late 1970s, the Air Force Occupational and Environmental Health Laboratory conducted studies that determined that dioxin was migrating slowly offsite via the drainage ditches. Based on those studies, the Air Force installed sediment filters in the drainage ditches to reduce the contaminant migration.

Site characterization of Area A was conducted in two separate campaigns in 1977-78 and in 1980-82. More than 1700 samples and 200 quality assurance samples were collected to characterize the 16-acre site. These sampling programs consisted of both surface and subsurface sampling. Surface

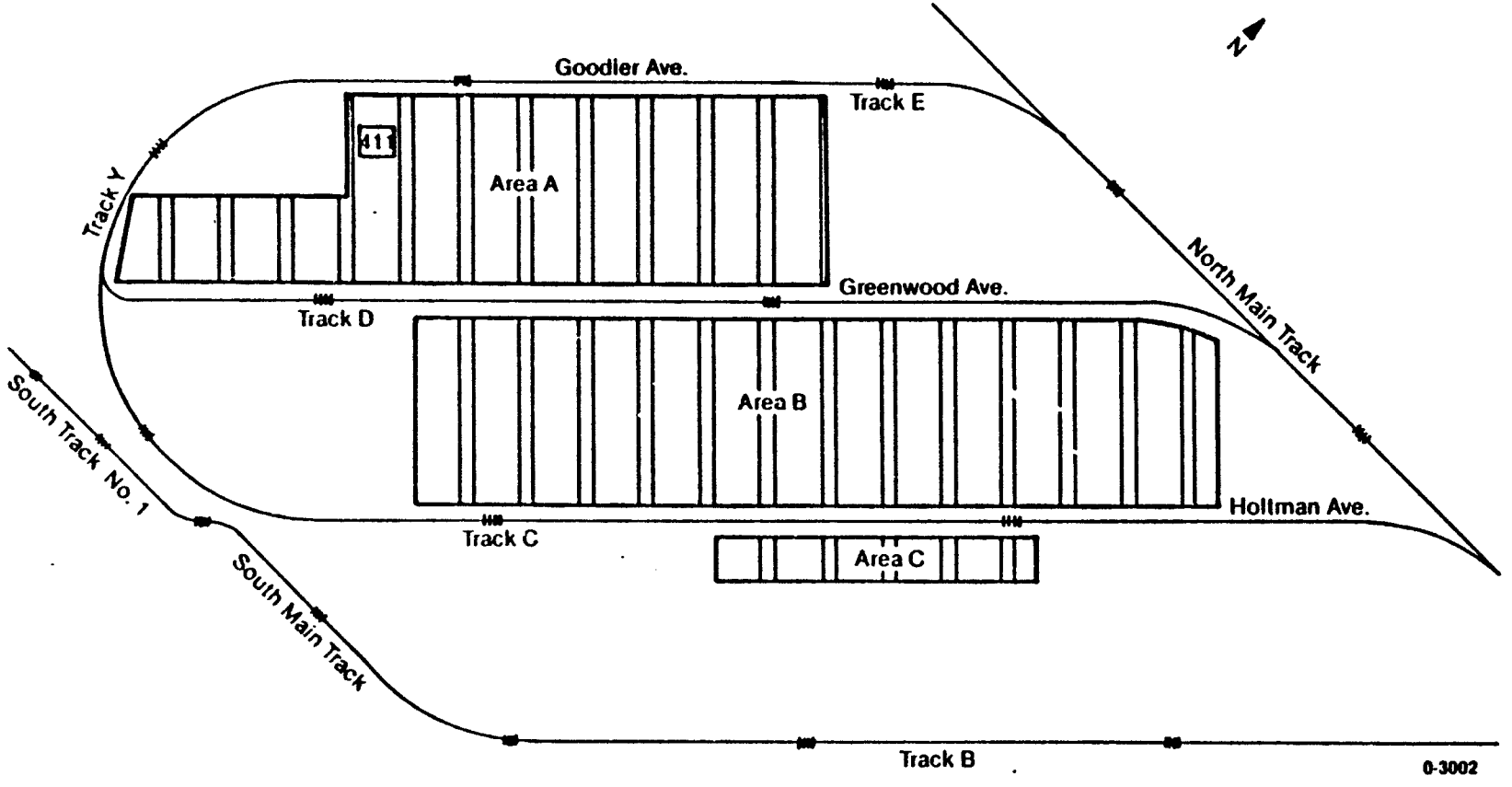

Figure 1. Former HO Storage Site

soil samples were obtained at depths up to 5 feet. The sampling program for Areas B and C conducted in 1986-87 consisted of 920 surface samples with an additional 87 samples collected for quality assurance purposes.

5. Time Line for NCBC Demonstration Project

To follow a project such as the NCBC Demonstration Project through to completion requires a great amount of time and patience. The total time for the NCBC Demonstration Project from the preparation of the statement of work by Air force personnel through site closure cannot be determined because site closure had not occurred at the time of writing this report. However, the following time line will give future project managers an indication of what they will face at least through field operations and equipment demobilization:

Prepare project statement of work	3 months
Select contractor; award contract	12 months
Contractor completes Part B permit application and environmental impact statement; document submitted to EPA	6 months
EPA publishes draft Part B permit; contractor answers EPA questions	12 months
Draft permit starts public comment period	2 months
EPA responds to public comments and awards final Part B permit	4 months
Incinerator set up and trial burns undertaken	3 months
Wait for trial burn lab results and test reports	2 months
Estimated time before remediation can begin	44 months
Field operations (based on 15,000 yd^3 of soil)	12 months
Equipment decontamination and demobilization	3 months
Total time for preparation and field operations	59 months

SECTION II
TECHNOLOGIES AND PROCESSES

This section provides a brief description of the incinerator and excavation and air monitoring equipment used during the NCBC Demonstration Project. A detailed description of the incinerator can be found in Reference 2, and a detailed description of the excavation and air monitoring equipment can be found in Reference 3.

A. INCINERATOR DESCRIPTION

The ENSCO incinerator system (Mobile Waste Processor--MWP-2000) was designed and fabricated by ENSCO in White Bluff, Tennessee. The MWP-2000 incinerator is a modular system designed to destroy and detoxify solid, semisolid, and/or liquid wastes. Most of the components of the system are installed on flatbed trailers, platforms, or skids to facilitate the movement of the system from location to location in order to perform on site cleanup of contaminated sites. Figure 2 is a system flow schematic of the MWP-2000.

Principal components of the unit are:

- Waste feed system
- Rotary kiln with outlet cyclone
- Secondary Combustion Chamber (SCC)
- Waste Heat Boiler
- Air pollution control train.

B. PROCESS DESCRIPTION

1. Waste Feed System

Contaminated soil was transferred from the soil storage area to the weigh hopper using a front-end loader. After recording the weight of the

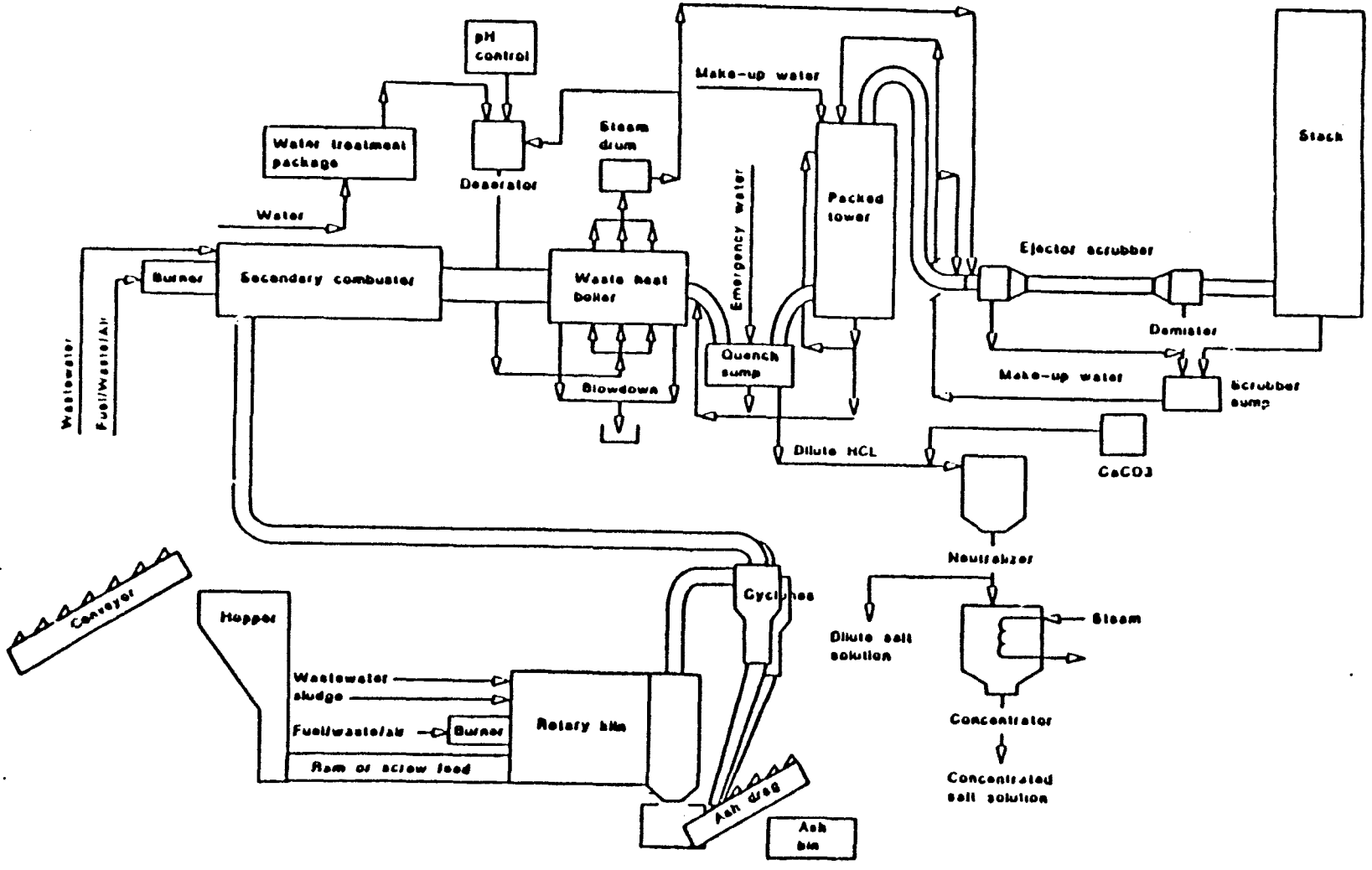

Figure 2. System Flow Schematic

contaminated soil in the weigh hopper, the soil was dropped into a shredder. As the soil passed through the shredder, it dropped onto a conveyor belt, which carried the material to the feed hopper/feed auger located on the front of the rotary kiln. The feed auger then pushed the soil into the kiln for processing.

2. Rotary Kiln and Cyclones

The rotary kiln is a carbon steel cylinder lined with 6 inches of fire brick mounted horizontally on a custom semi-trailer. The kiln has an interior diameter of 5.5 feet and an interior length of 30.0 feet. The kiln is mounted so that it can be declined (front to back) 4 degrees; it is capable of being rotated from 0.5 to 4.0 revolutions per minute (rpm). The declination for this project was 2 degrees and the rotational speed of the kiln was normally 1.5-2 rpm. The soil entered the kiln at the flame end (front) of the kiln and was subjected to temperatures of approximately 2200°F at the burner and to a minimum temperature of 1450°F at the outlet end of the kiln.

Because of the declination and rotation of the kiln and the continuous feed of soil, processed soil (ash) was pushed to the lower end (rear) of the kiln in approximately 20 minutes where it would fall through the kiln drop chute into the ash removal system. The kiln outlet gases and lighter particulate would exit the kiln at a minimum temperature of 1450°F, passing through a cyclone on their way to the secondary combustion chamber (SCC). The cyclone's purpose was to remove the lighter particulates from the kiln outlet gases before they reached the SCC.

3. Secondary Combustion Chamber

The SCC is a carbon steel cylinder mounted horizontally on a custom semi-trailer. It is lined with 2.25 inches of insulating brick and 4.50 inches of fire brick. It has an interior diameter of 6.6 feet and an interior length of 40.0 feet. It is designed to further burn the gases discharged from the rotary kiln. The gases were delivered to the SCC through a rectangular carbon steel duct at the burner end of the SCC. The gases were subjected to temperatures ranging from approximately 3000°F at the burner to a minimum 2,150°F at the outlet end of the SCC.

4. Waste Heat Boiler

The gases exited the SCC and were carried to the waste heat boiler (fire tube boiler) through a carbon steel, T-section duct. The vertical outlet of this T-section duct was equipped with an access lid, which could be opened to vent hot gases away from the boiler and the downstream air pollution control train. As the gases exited the SCC, they passed through a water spray to reduce the gas temperature from approximately 2150°F to 1400-1600°F before they entered the waste heat boiler. The purpose of the water spray was to cool the particulate entrained in the gases to minimize their condensation on the boiler face and in the boiler tubes.

5. Air Pollution Control Train

The air pollution control train consisted of a quench system, packed tower, ejector scrubber, stack, and effluent neutralization tank. This equipment train was designed to cool and remove acid and submicron particulate from the gases that exited the waste heat boiler and to neutralize the effluent generated in this train.

The gases exited the waste heat boiler at a temperature of approximately 400°F where they immediately passed through the quench system (water spray) to further reduce the gas temperature to approximately 165°F before the gases entered the packed tower.

The packed tower was designed to remove acid from the gases, but for this project it mainly removed submicron particulate from the gases. From the packed tower the gases flowed through the ejector scrubber to further remove submicron particulate and acid.

The ejector scrubber served as the prime mover for the entire system. The drawing of gases through the ejector mixing tube produced up to 25 inches water column vacuum. This was sufficient vacuum to draw gases through the kiln, SCC, waste heat boiler, and the air pollution control train. The gases exited the ejector scrubber through the demister and out the stack.

The stack was equipped with a gas sampling system that collected, conditioned, and delivered a continuous stack sample stream to oxygen, carbon monoxide, and carbon dioxide analyzers. These analyzers continuously analyzed the sample stream and transmitted results to the data acquisition and control computer. Strip chart recorders provided redundant recordings of these parameters.

C. EXCAVATION AND STORAGE OF SOIL

Several excavation methods were used in the HO-contaminated soil excavation and soil storage operations at the NCBC. The primary method was to use a small asphalt planer owned by the Air Force to remove the top 3-6 inches of cement-stabilized soil. A bulldozer and a front-end loader were used to scoop up the fine milled soil produced by the asphalt planer. The front-end loader deposited the soil in a covered dump truck for transportation to the soil storage area. After the cement-stabilized soil layer was removed from a plot, deeper excavation of that plot was done with a small bulldozer and front-end loader, or the track hoe. The excavated soil was placed in domed tents to provide some drying, to protect the soil from precipitation, and to reduce the potential for fugitive dust emissions.

The asphalt planer was only used in areas where large numbers of adjacent plots needed to be excavated. In areas where the soil contamination was relatively high, deeper excavation was required. Also, many plots were situated such that the asphalt planer could not maneuver, therefore, on those plots, a track hoe was used for excavation. The track hoe excavated the soil and placed it directly in a dump truck, which was covered during transport. The truck moved the excavated soil to the soil storage area to await processing.

D. AMBIENT AIR MONITORING

Because soil excavation was the most likely activity to result in movement of dust offsite, all air monitoring (with the exception of background air monitoring) was performed during soil excavation activities. Air monitoring was performed using two different types of air monitors: a polyurethane foam (PUF) monitor and a high-volume monitor. The PUF monitor used a two-stage

filtration system consisting of a particulate air filter and a PUF filter. The particulate filter was intended to capture solid particles, while the PUF cartridges absorbed semivolatiles that may have been present in the air or may have been stripped off the solid particles. To minimize the chance of stripping semivolatile organic compounds off of the two-stage filter, the PUFs were operated at a low volumetric flow rate of approximately 10 ft^3/min. The Hi-Vol air sampler drew ambient air through an 8- by 10-inch borosilicate filter at a rate of approximately 40 ft^3/min. Hi-Vol samples were used primarily to measure gross particulates. During the first 2 months of operation, five PUF monitors and two Hi-Vol monitors were used on each day of excavation for this sampling activity. The number of monitors used each day was later reduced because of favorable analytical results. Initially four portable sampling stations were used to monitor the air upwind and downwind of the excavation site.

SECTION III
PLANNING AND IMPLEMENTATION

This section provides a description of the Project Management Plan (PMP) that delineates the EG&G Idaho management tasks and describes the project management software package that was used during the NCBC Demonstration Project. The section also contains information on the daily management, contract management, etc., that was necessary to successfully complete the project.

A. PROJECT MANAGEMENT PLAN

EG&G Idaho requires that all projects be planned and controlled. To implement this policy a PMP was be prepared. The PMP addressed the following elements:

- Work scope
- Work breakdown structure (WBS)
- Organization, responsibilities, and authority
- Schedules
- Budgets and cost estimate basis
- Resource Allocation Plan
- Quality Program Plan
- Safety Plan
- Security Plan
- Management, Planning, and Control Plan
- Reporting requirements

- Configuration Management Plan
- Change Control Plan
- Appendix.

The following is a discussion of these elements as described in the NCBC Demonstration Project PMP.

1. Work Scope

The work-scope section began with a general background statement followed by the objectives of the project that was to determine the most cost effective, currently available technology to return HO contaminated sites to beneficial use. This information was followed by a description of the tasks involved to achieve that objective such as subcontractor selection, obtaining required permits and government approvals, the demonstration activity, and the final reports.

2. Work Breakdown Structure

The WBS provided a standardized framework for integrated project planning, work-scope definition, scheduling, and cost accounting. Cost accounting and budgeting information was tracked by the Cost and Planning System, and a computer software program named PROMIS® was used for project management and performance measurement.

3. Organization, Responsibilities, and Authority

An organization chart identified the individuals that had significant involvement such as project management personnel, subcontract administrators, and financial service personnel. A simplified organization chart is shown as Figure 3.

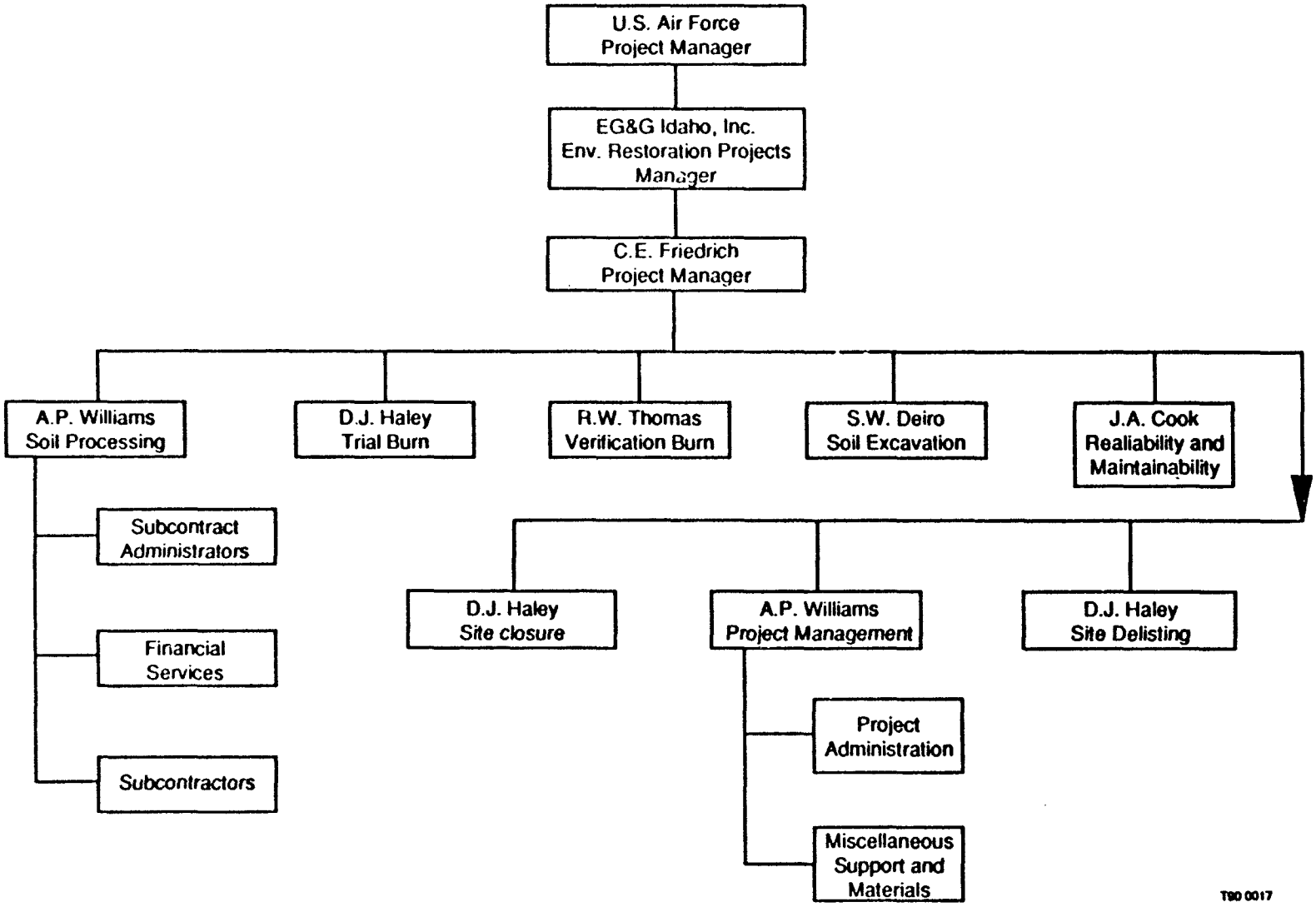

Figure 3. Organization Chart of the NCBC Demonstration Project

4. Schedule

The schedule in the NCBC Demonstration Project PMP encompassed the major customer and management requirements listing them by subproject number, a brief description, and early/late start and early/late finish information for each requirement.

5. Budgets and Cost Estimate Basis

Budgets were established for each task indicated on the WBS. All of the budgets were time-phased and approved by the manager of the personnel responsible for doing the work.

6. Resource Allocation Plan

This section refers to personnel resources that were required to perform the work described in the WBS. All individual contributors were identified and their time scheduled.

7. Quality Program Plan

The responsibility for the implementation of the quality requirements was assigned to the individual performing the work. The responsibility for quality unification was assigned on an as-needed basis as resolution of quality related problems became necessary. A quality plan, EG&G Idaho Quality Assurance Project Plan Environmental Restoration Technology Study for the NCBC Gulfport, Mississippi, provided direction for quality control for the project. The Quality Program Plan is presented in Appendix A.

8. Safety Plan

The responsibility for safety, preserving personnel health and safety, correcting unsafe conditions, and following NCBC rules and regulations was assigned to the Program Manager.

The subcontractor was responsible for preparing a safety plan for onsite work. All personnel, including subcontractor and EG&G Idaho personnel,

were subject to the subcontractor safety plan. Individuals were responsible for taking all necessary precautions to prevent injury to themselves and their associates. Employees were expected to perform only those tasks that they believed they could do safely and to immediately report any unsafe conditions.

9. Security Plan

The security requirements of the NCBC were followed for the onsite work. All employees were required to obtain personnel and vehicle passes for NCBC access.

Also under the area of security were communications, computer security, and database information backup.

10. Management, Planning, and Control Plan

The first part of this section (management) simply states that the designated program manager will be responsible for implementation of the practices and procedures described in the remainder of this section. The second part, planning, briefly describes the PMP contents, financial work package information, and project baseline information. The third part, project control, consists of progress measurement (cost and schedule), performance evaluation (cost and schedule), and corrective actions as appropriate.

11. Reporting Requirements

A monthly report was prepared and transmitted to the Air Force Project Manager by the 25th of each month. The following information was continued in these monthly reports:

a. Summary Status--A brief summary of project activities.

b. Accomplishments--Technical accomplishment for the month.

c. Milestone Status--A one page listing of key and major milestones with completion dates assigned.

d. Cost/Schedule Status--Actual cost of work performed. Earned value was used on a task when a firm scope of work for the task was known. Otherwise, the costs were treated as a level of effort.

e. Variance Analysis--Significant (+ or -10 percent) cost, schedule, and at completion variances were reviewed, the identification, cause, impact, and corrective action were examined in detail.

f. Problems/Potential Problems--Any major problems that could impact the scope, schedule, cost, or success of the project were reviewed.

12. Configuration Management Plan

A specific configuration management plan was not applicable to the NCBC Demonstration Project. (Configuration management is the process of keeping hardware, software, or other products, including systems and related documentation, in agreement. It involves establishing defined baselines, controlling changes to those baselines, and reporting status to those needing the information). All project information was updated during the life of the project with the resulting project file being kept by the Program Manager for a period of 3 years. The project files will then be transferred to records storage.

13. Change Control Plan

All changes to the work scope, schedule, and budget for the project were outlined in the PMP. All changes and revisions were incorporated into periodic revisions to the PMP.

In addition, changes to documentation followed requirements specified in WT-DOD-1.1, Management and Control of Department of Defense Tasks, Sections 3.24 through 3.28.

14. Appendix

The appendix of the PMP contains reference data, procedures, work breakdown structure, schedules, etc.

B. PROMIS® COMPUTER PLANNING TOOL

A project management tool such as the PROMIS® computer software package provides visible requirements for planning and tracking of project tasks. Other project management software packages can be used that offer the same desired features such as (a) scheduling, (b) resource allocations, (c) nonlabor cost input, (d) cash flow output (spending curve), and (e) earned value analysis.

C. MAJOR MANAGEMENT TASKS

1. Data Collection

Two types of data collection were performed at the NCBC Demonstration Project--one for the reliability/maintainability data and one for sample (soil, air, ash, water) tracking. The methods of collection are discussed below:

a. Reliability/Maintainability

The original concept for data collection was to use either an Scheduled or Unscheduled Maintenance Form (See Reference 4) for all incinerator maintenance. These forms were to list the item being worked on, the time (in hours and minutes) required for repair, the time (hour of the day) the part failed or required maintenance, and the cost of repair or replacement if known. It proved to be difficult to convince the subcontractor to use the forms and in fact they were not used at all for the first several months of operation. In February 1988, with the addition of an EG&G Idaho onsite representative specifically responsible for incinerator availability, the forms were finally put to use.

In addition to these forms, data from the Operator Log and Supervisor Log were also used to collect reliability/maintainability information.

To aid the data entry into a computer software database package, a component code list (Reference 4) was established. The person preparing the

Scheduled/Unscheduled Maintenance Form also used the component code number rather than writing out the name of the component.

The database information consisted of the date of repair, the type of maintenance (i.e., S = scheduled, U = unscheduled), the component code, the incinerator downtime (not processing soil) in minutes, the labor hours to make the repair (if outside labor was used), parts cost (if known or applicable), and a remarks section to briefly describe the maintenance performed.

b. Sample Tracking

The same database software (dBase III) package used for tracking reliability/maintainability data was used for all of the sample data collected on the NCBC Demonstration Project. Personnel collecting the various samples supplied a copy of their sampling data sheets to the data entry clerk who entered the information on the database. This information consisted of the (a) date the sample was taken, (b) the sample location, (c) the sample number, (d) the depth of the excavation (if a soil sample), and (e) the data results.

2. Permit Compliance Management

The overall permit compliance management was the responsibility of the INEL Program Manager located at the INEL. The daily compliance management at the site was directed by one of the INEL onsite representatives. There was daily communication between the INEL and the site to maintain control of the permit requirements. If a permit requirement was not being complied with by the subcontractor(s), the onsite representative had the authority to stop soil processing or any other permitted activity until the situation was corrected.

3. Contractual Oversight

Contractual oversight for the project was the responsibility of the INEL Project Manager. These responsibilities included, but were not limited to (a) negotiating and/or renegotiating contracts, (b) payments to subcontractors, (c) project costs, (d) project safety, (e) personnel training, (f) maintenance of the EPA Part B permit, and (g) project schedule. Two INEL

representatives were stationed at the NCBC Demonstration Project site throughout the project to aid the INEL Project Manager in meeting these responsibilities.

SECTION IV
CONTRACTUAL ARRANGEMENTS

A. ENVIRONMENTAL SERVICES COMPANY

Incineration was chosen as the best available technology to demonstrate reliability and maintainability to achieve the project goals at the lowest cost. The rotary kiln was chosen because of the availability of incineration data, the mobility of the incinerator, and the lack of detailed data from other processes.

ENSCO was chosen for the demonstration project because of its proven operations using a mobile incinerator system called Mobile Waste Processor 2000 (MWP-2000). It was the only company that had a full-scale, readily available mobile incinerator system.

ENSCO's subcontract for the NCBC Demonstration Project was considered to be a standard cost-plus fixed-fee (CPFF) subcontract. In a CPFF contract, the subcontractor submits a cost estimate prior to signing the contract. Based on this cost estimate, the contracting officer and the subcontractor negotiate a fixed-fee or profit. If the actual costs for the project exceed the original estimate, the contracting officer will pay the excess legitimate costs, however, the fee remains fixed throughout the project for the given work scope. If the work scope expands by request of the contracting officer, an additional fee may be negotiated. This type of contract is commonly used for research and development projects where there are numerous uncertainties in the scope of work.

To increase the tons of soil being processed per month, it was determined that an incentive fee over and above the 8% fixed fee would improve production. The incentive fee provided an additional profit to the subcontractor for processing soil at a rate above 2000 ton/month. This revision to the ENSCO subcontract was implemented in March 1988. As described in Reference 5, the implementation of the incentive fee appeared to be a significant factor in increased production rates and thus lower costs to the Government.

The NCBC Demonstration Project was the first of its kind, therefore the scope of work could not be defined sufficiently to negotiate a fixed price or unit price contract. Without a clearly defined work scope, a fixed price or unit price contract would have resulted in numerous change orders, probably costing more in the end than the cost-plus fixed-fee contract used.

A second reason for choosing a cost-plus fixed-fee contract was to obtain the incinerator reliability and maintainability information. With a fixed-priced contract, the subcontractor would have no obligation or incentive to collect and provide detailed reliability, maintainability, and cost data for others to use.

B. VERSAR, INC.

The contract with Versar, Inc., of Springfield, Virginia, was also a standard cost-plus fixed fee (CPFF) subcontract. Versar was used for all the sampling at the NCBC, including the original site characterization and the ambient air monitoring during the demonstration project soil excavation activities. Versar also prepared the Quality Assurance Plan for the project closure operations sampling and reporting, and is coauthor of the ash delisting petition.

C. ANALYTICAL LABORATORIES

For routine, daily operations, two laboratories were used for analyzing the soil and ash samples. Two laboratories were utilized to avoid overloading a single lab and also in case of adverse weather conditions at one facility or the other. Normally, Envirodyne Labs of St. Louis, Missouri, analyzed the bottom-of-hole (BOH) soil samples, and U.S. Testing of Hoboken, New Jersey, analyzed the processed soil (ash) samples. U.S. Testing also analyzed the archived soil composite samples. The use of two laboratories also provided an added quality assurance measure.

The monthly comprehensive ash samples were analyzed initially by IT Analytical Services in Knoxville, Tennessee, and later by Twin Cities Laboratory in St. Paul, Minnesota.

The contracts with the laboratories were set on a fixed price per sample basis. This type of contract works very well allowing a project manager or customer to know exactly what the costs will be. No problems were encountered with these contracts during the project.

D. MISCELLANEOUS SUBCONTRACTS

During the course of the project there were numerous lease contracts for such things as trailers for office space (Gelco and Beautilite), roll-off boxes for ash storage (Browning Ferris Industries), and heavy equipment (Hertz, Blacker, etc.). The heavy equipment included the track hoe, front-end loaders, a fork lift, and a three dump trucks for contaminated soil or ash hauling.

The decision(s) to lease the heavy equipment was based on the premise that the project was of short duration (less than 6 months). At the least, lease contracts with options to buy should have been used. A better agreement would be for the incinerator owner/operator to own the equipment that is necessary to complete the project. The incinerator owner/operator moves the equipment to each job site. With this system it would only be necessary to lease specialized equipment, and then only for the task it is intended to perform.

SECTION V
FIELD OPERATIONS

This section describes the day-to-day activities of the project as related to project management and the management decisions made to achieve project goals.

A. INCINERATOR SETUP AND TESTING

1. Silica Fouling of Waste Heat Boiler

The most significant management decisions made during the setup and testing phase of the program were in response to technical needs rather than personnel or regulatory necessities. For example, the NCBC water supply contained a high dissolved silica content that would have caused fouling of the waste heat boiler. To improve the performance of the incinerator system during the verification burn, a combined management decision was made to lease a semi-trailer sized deionizing unit. Following the Verification Test Burn, a desilicizer unit was purchased and ready for the RCRA Trial Burn and routine operations.

2. Sanitary Waste Holding Tanks

The management decisions to use temporary holding tanks for sewer waste and to not install sewer lines for the office trailers was made during the equipment setup phase of the project. That decision was made on the premise that the project would only last approximately 90 days for soil processing and that the cost of pumping and removing the sanitary waste would be far less expensive than installing a sewer line. Subsequently, additional contamination was found that extended the soil processing phase to approximately 1 year. In hindsight, project management should have evaluated the sanitary sewer decision soon after the additional contamination was discovered; installation of the sewer line would have been far more convenient and probably as cost effective.

3. Processed Soil Disposition

The processed soil produced from the incineration of soil contaminated with HO is still considered a hazardous waste. As such it must be disposed as hazardous waste. Alternatively the waste may be removed from the EPA list of hazardous waste; this process is called delisting. At the time of project initiation, there were no disposal sites that were permitted by the EPA to accept the processed soil. Therefore, prior to project commencement, the Air Force made a management decision to pursue delisting. As a result, the Verification Test Burn sample plan was designed to maximize the amount of data collected that could support a delisting petition. Additionally, the Air Force and its subcontractors openly discussed the needs of a delisting petition with the EPA to ensure that all necessary data was collected.

4. Decision to Pursue RCRA Trial Burn

Following the Verification Test Burn a hold period was scheduled in which the analytical data were to be analyzed and reported to EPA Region IV. Just prior to presentation of the data to EPA Region IV, the Air Force learned that a RCRA "six-nines" Trial Burn would be required in addition to the Verification Test Burn. The absence of the RCRA Trial Burn at the project commencement was predicated on the assumption that an identical incinerator owned by ENSCO had previously passed the trial burn requirements from a test performed in the spring of 1986. Just prior to the Verification Test Burn in December 1986, EPA Region VII notified ENSCO that its trial burn failed, but ENSCO did not notify the Air Force or EG&G Idaho of this shortcoming. The Verification Test Burn proceeded and accomplished its original goals, however, it did not demonstrate compliance with the "six-nines" destruction and removal efficiency requirements as specified in 40 CFR Part 264 (O). As a result, EPA Region IV justifiably required the Air Force to demonstrate compliance with the destruction and removal efficiency requirements prior to commencement of routine soil processing.

The Air Force then made a management decision to pursue the RCRA Trial Burn rather than cancel the project. A variety of factors entered into this decision, however, the most significant one was the knowledge that the former HO storage site would eventually require remediation and the cost of canceling

the project and remobilizing later would be much more costly than proceeding with the trial burn. Additionally, a trial burn would probably be required in any future remedial action.

5. Surrogate Sampling During Trial Burn

The trial burn was planned and implemented as described in Reference 6. The trial burn plan called for a homogeneous mixture of a surrogate principal hazardous organic constituent (POHC) and clean builder's sand (the builder's sand was to act as a surrogate for the native NCBC soil). Operations personnel had difficulties in mixing the surrogate POHC with the sand. Because the analytical laboratory was remote from the NCBC, Federal Express services were normally contracted to deliver the samples to the laboratory. On one occasion, a batch was mixed and sampled on a Sunday and data results were needed as soon as possible; proceeding with the trial burn was contingent upon receipt of the analytical data from the laboratory. Unfortunately, Federal Express and other overnight carriers do not collect packages on Sunday. Because of the high lease costs of the incinerator unit and the labor costs of the support personnel, a management decision was made to charter a private aircraft to deliver the samples on Sunday. The additional cost of the aircraft charter paled in comparison to the incinerator lease and labor costs.

6. Trial Burn Reporting

Following the trial burn, EG&G Idaho project personnel developed a detailed report outline for the trial burn report. This outline was transmitted to EPA Region IV for approval. Additionally, a rough draft trial burn report was sent to EPA Region IV for review with respect to general format, content, and completeness. This step was taken to ensure that the report authors were working in a direction that was compatible with EPA needs and requirements. EG&G Idaho was also striving to present a report that would be easy for the regulating agencies to review in the hope of expediting the review process. This preliminary work was an effective management decision that expedited the EPA review process; the final Trial Burn Report contained the details required by the EPA and reduced the amount of revisions and additional data requests. Nevertheless, due to other technical and regulatory

difficulties, permission to commence soil processing was not received until 6 months after the trial burn.

B. ROUTING OPERATIONS

1. Plan of the Day Meeting

The plan of the day meetings were initiated by EG&G Idaho during the trial burn. Air Force, EG&G Idaho, and ENSCO personnel would meet to discuss what had been accomplished for that day and the plans for the next day. Although the overall plan for the project called for continuation of these meetings on a daily basis, this never materialized. With the heavy schedule of the day's activities, personnel changes, and finally the incinerator operations becoming reasonably routine, the plan of the day meetings became less frequent until they became nonexistent.

2. Documented Plan of the Day

In November 1987, a Plan of the Day form was initiated to coordinate the daily activities of the project. The form, generated by an EG&G Idaho onsite representative, usually covered such items as soil processing, plot excavation and backfilling, sampling, and special activities. Copies of the plan were distributed each day to the Air Force, ENSCO Plant Superintendent, ENSCO Safety Officer, Versar, and the Excavation/Backfill crew. After reviewing the Plan of the Day form, the onsite personnel would hold a plan of the day meeting to discuss the following days activities. The original was kept on file by the EG&G Idaho site representative.

The use of Plan of the Day form was discontinued the first part of January 1989 during the demobilization of the incinerator unit.

3. Data Review Forms

A few weeks after the start of soil processing, a decision was made to create two forms for keeping track of the incoming daily data. One form would cover air monitoring and sampling and the other form would cover the operations activities. Each form was broken into categories to cover the type

of data normally received. As the daily operational data were received, an EG&G Idaho site representative would review the data for completeness, date, and sign off in the appropriate space for each item received. To aid in the collection of the data on a daily basis, the operations form was revised to include spaces for ENSCO to initial to show that it had collected the data and transferred them to an EG&G Idaho site representative. Normally an EG&G Idaho site representative filed the operational data in the appropriate file after reviewing the data. The sampling data were normally directly received by an EG&G Idaho site representative, who would review the data sheets for completeness, initial, and date them. These data were then given to the data clerk, who would enter the data on the database and then file the data sheets.

4. Action Item List

Because of the numerous activities taking place in preparing for the start of soil processing, an Action Item system was initiated on 22 October 1987. With this system, an EG&G Idaho site representative filled out an NCBC Action Item form, discussed the action item with the subcontractor superintendent or his alternate, and issued copies to the subcontractor and the INEL. The original form was kept in an Action Item Logbook. As the action items were completed by the subcontractor, an EG&G Idaho site representative recorded them and the completion date in the logbook and on the original action item form.

In the latter part of March 1988, the action item list was extended to include action items between the Air Force and EG&G Idaho. This was done because numerous actions previously agreed to had been sidetracked or forgotten for a variety of reasons. These action items, normally issued by EG&G Idaho INEL personnel, were kept in a separate Action Item Logbook from the EG&G Idaho/subcontractor action items. The distribution for these action items was the NCBC, INEL, and Tyndall Air Force Base.

5. Daily Reports

The daily reports were generated by the ENSCO Plant Superintendent and consisted of (a) the soil tonnage processed the preceding 24 hours, (b) total soil tonnage processed for the month, (c) total hours of soil processing in

the preceding 24 hours and for the month to date, (d) total tonnage processed since the start of the project, (e) soil moisture readings, and (f) a description of the previous 24-hour activities.

Information from the daily report was used by the EG&G Idaho site representatives to fill out the weekly report that was requested by the Air Force.

6. Audits

The control of the incinerator operations was maintained by onsite EG&G Idaho personnel who observed and audited the daily operations. The daily documentation for the incinerator, excavation, sampling, and air monitoring was reviewed for accuracy and completeness by EG&G Idaho onsite personnel. Any deficiencies observed were resolved routinely with the site personnel on a daily basis. If a permit or procedure noncompliance arose, the appropriate action was taken. EG&G Idaho, Air Force, and EPA personnel were advised of any permit noncompliances on a timely basis.

The health and safety records and procedures used on the project were reviewed and audited by EG&G Idaho Health and Safety during the project. These audits supported the ENSCO Health and Safety Officer's efforts and resulted in safer procedures and work habits for the project. Any procedure and record deficiencies were identified at an early date and corrected by the subcontractor. The audits were conducted before major work efforts such as the decontamination and demobilization of the incinerator and during normal incinerator operation at the beginning of the project.

7. Daily Analytical Data

As analytical data were received from the laboratories, they were given a cursory review by onsite EG&G Idaho personnel for completeness, initialed, and filed in the daily files. Periodically, the laboratories sent sample reports to the INEL Chemistry Department for data validation. These reports were reviewed thoroughly for, but not limited to, the following: (a) completeness, (b) procedure sequence, (c) instrument calibrations, (d) calculation of maximum possible concentration results, (e) sample weights,

and (f) at times to make qualitative judgments on questionable sample results.

8. Administrative Personnel

The administrative services of the project consisted of a secretary, a bookkeeper, and a data entry clerk.

The secretary was a permanent employee of ENSCO, having been hired in 1986 during the setup of the incinerator. Although a direct employee of ENSCO, the secretary also performed work for EG&G Idaho and Air Force personnel.

The bookkeeper was a temporary employee of ENSCO. The functions of the onsite bookkeeper were to control purchase orders, receive invoices from vendors, prepare the invoices for approval by the ENSCO Plant Superintendent, and transmit the invoices to ENSCO's main office in Little Rock, Arkansas for payment.

The data entry clerk was a temporary, part-time employee hired through Kelly Services, Inc. The clerk's primary duties were to enter sample data on the computer database, maintain the project status map showing the soil excavation and BOH sample results, and file daily operational and sampling data. She also, on occasion, typed correspondence and was the secretarial relief.

9. Purchasing

The ordering and purchasing of all materials required for operation of the incineration project were the responsibility of ENSCO. When the incineration of the dioxin-contaminated soil began, ENSCO did not have a person assigned to handle purchasing full time. This created confusion with several people contacting vendors and ordering supplies. Sometimes the supplies did not get ordered in an efficient and timely manner. Thus, ENSCO hired a person to deal with vendors and handle all purchase orders. This put one person in charge of all purchasing and eliminated much confusion in tracking ordered materials.

10. Leasing

Some items for the project were rented or leased to satisfy DOE requirements. For instance, the purchase of computers for customers is strictly prohibited for DOE contractors. The disposal of government-owned equipment at the end of the project was a concern for the Air Force; thus, many items were rented or leased to eliminate any disposal problems. The front-end loaders, bulldozer, light standards, roll-off boxes, office trailers, copier, telefax machine, and computer were all rented or leased. The water tanks were purchased with an agreement that the seller would purchase the tanks from the project at the time they were released at the completion of the project.

11. Sample Turnaround Time

All samples were shipped from the site via Federal Express. The Federal Express pickups were normally made in the late afternoon with a next day delivery to the respective laboratory except for those shipments made on Friday. A Saturday delivery to the laboratory was not requested on a routine basis.

Normally, one-third of the BOH soil samples shipped each day were on a 3-day turnaround, which meant that after receipt of the samples by the laboratory results could be expected within 3 days. The remaining two-thirds of the soil samples shipped on a particular day were to be analyzed within 5 days after receipt at the laboratory. The 3-day turnaround for a third of the BOH soil samples was requested for soil excavation scheduling purposes. The quicker plots could be determined to be clean, the easier it was to schedule new plots to be excavated.

Ash samples and soil composite samples were routinely analyzed on a 5-day turnaround after receipt at the laboratory.

The analytical results were recorded on the chain of custody form accompanying the samples and telefaxed directly to the project office at NCBC. A formal report of the analytical results was issued directly to EG&G Idaho by the individual laboratories at a later date.

12. Decontamination and Demobilization

The decontamination and demobilization activities started as soon as soil processing was completed (19 November 1988). Decontamination of the equipment was a tedious process, taking nearly 2 months to complete. Some of the contributing factors for the slow decontamination process were (a) the cleaning of the roll-off boxes (removing the water tight seals), (b) burning all of the decontamination water, (c) waiting for swipe sample results, and (d) several swipe samples had to be retaken because of a contamination problem. The contamination came from the disposable gloves being worn by personnel taking the samples. The hexane used for swiping was breaking down the glove material.

Conversely, the demobilization task was accomplished in a couple week's time with no problems. The incinerator and supporting equipment left the NCBC on 6 February 1989.

The final demobilization task was to repair the chain-link fences, pick up debris, and repair the railroad tracks. These activities were completed before the end of February 1989.

SECTION VI
MISCELLANEOUS SITE SERVICES

There were numerous miscellaneous services used at the site that were essential to the overall success of the project. Some of these services are briefly described below.

A. TELEPHONE COMMUNICATIONS

A good telephone system was needed for the NCBC Demonstration Project. Separate lines were needed for the office area, telefax machine, computer modems, and the incinerator control room. Having separate lines for the telefax machine and control room especially played significant roles in the success of the project as they were the only communications links when the office telephone distribution box failed.

B. SEWER SERVICES

The sewer service for the project was contracted to Browning Ferris Industries. This service constituted one portable rest room for the workers in the field and four portable septic systems for the offices and guest trailer. The portable systems were normally maintained twice a week by a special Browning Ferris Industries truck.

Because of the duration of the project, it would have been much more convenient to have connected to the NCBC sewer system and probably more cost effective.

C. LAUNDRY SERVICE

Laundry service for the project was contracted to a local (Gulfport, Mississippi) firm. It supplied laundry services for coveralls and towels used by personnel working in the field. Laundry was usually delivered and picked up once a week.

D. ADMINISTRATIVE SERVICES

The administrative staff consisted of the plant superintendent, secretary, bookkeeper, data entry clerk, purchaser/expediter, and safety officer.

A plant superintendent, secretary, safety officer, and bookkeeper were onsite from the beginning in September 1986. The data entry clerk was added to the staff in December 1987 to input excavation, sampling, and analysis data on a computer database. The purchaser/expeditor was added to the staff in March 1988. Before that time shift supervisors and/or the safety officer performed the purchasing/expediting duties.

E. PROJECT MANAGEMENT STAFF

From September 1986 until September 1987 the EG&G Idaho staff fluctuated in size depending on the project activities. With the anticipation of the start of soil processing in September 1987, a full-time EG&G Idaho representative was onsite. However, because soil processing was a 24-hour/day, seven-day/week operation, coupled with the startup problems they were having, it became too much of a burden for one person to monitor. On 1 February 1988, a second EG&G Idaho employee was added to the onsite staff.

F. VENDING SERVICES

Several local firms supplying vending services to the NCBC also serviced the project site. Bottled water coolers were positioned in the personnel decontamination trailer, break trailer, and the office area. Coffee service was available in the office area and the break trailer. Other vending services in the break trailer included a snack machine and soft drink machine.

G. TELEFAX

The telefax machine was an important tool in the success of the project but it did not come easy. Originally the project used the telefax machine at the NCBC Environmental Office. This required the project secretary to travel back and forth to the Environmental Office for receiving and sending all

information. Rather than purchase or lease a telefax machine for the project, EG&G Idaho sent a loan machine to the site. This machine was plagued with mechanical problems that appeared to be not economically feasible to overcome, therefore, a telefax machine was leased from a local vendor. The telefax was used to receive sample analysis information expeditiously from the laboratories, and to transmit information to both the Air Force Engineering and Services Center (AFESC) at Tyndall Air Force Base and EG&G Idaho.

H. FEDERAL EXPRESS

Federal Express was used exclusively to send samples to the laboratories for analysis. Its services were used because of its size and reputation for delivering packages on schedule. To save project costs, however, empty sample containers were returned to the site via United Parcel Service.

I. COMPUTERS

The main computer used in the control room for data acquisition was an Issacs 5000 with IBM supporting equipment. The software packages to monitor the incinerator operation were developed specifically for the NCBC project to include the EPA required operating parameters. Cleaning and/or repairs to the system were performed by a local computer firm. The computer to maintain the databases was an IBM XT using a dBase III, Plus software package. All repairs to this unit were also made by the local computer firm. Three other computers were used on the project for cost tracking (with Lotus 1,2,3 software), and normal office correspondence using an established software package.

J. OFFICE SPACE

The office space for Air Force personnel, the ENSCO secretary, and EG&G Idaho personnel consisted of two leased trailers parked side by side with a connecting covered walkway. The ENSCO Plant Superintendent, bookkeeper, and purchaser/expeditor were housed in another leased trailer. All furniture for the office areas were leased form local furniture leasing firms.

K. GUEST TRAILER

In addition to the office trailers, a guest trailer was used for visitors to the project and for meetings of project personnel. This trailer and its furnishings were also leased from local vendors.

SECTION VII
CONCLUSIONS AND RECOMMENDATIONS

A. CONTRACTUAL

1. Conclusions

As discussed earlier in Section IV, ENSCO's subcontract for the NCBC Demonstration Project was considered to be a standard cost-plus fixed-fee (CPFF) subcontract. This type of contract is generally used for research and development projects where there are numerous uncertainties in the scope of work as was the situation for this project. A fixed price contract and resulting change orders would in all probability have resulted in higher costs than were seen at NCBC.

However, there were instances where a fixed price contract could have been used such as:

- Mobilization and setup
- Verification burn tests
- Decontamination/demobilization.

2. Recommendations

It would be beneficial to have as much fixed price contracting as possible in those areas that should be easier to estimate based on owner/operator past experience. Soil excavation and soil processing would be the two areas with a lot of uncertainties and, therefore, not subject to the fixed price type contract. Another alternative to the CPFF contract for soil processing would be a cost per unit process.

All operational contracts, whether fixed price or CPFF, should have performance, safety, and environmental compliance clauses built in. Perhaps monetary penalties for contract violations would encourage the subcontractors

to perform to the best of their abilities. An example subcontract delineating the recommendations discussed here is shown in Appendix B.

As with this project, it is desirable to have more than one laboratory under contract to analyze the daily soil and ash samples. If the prime laboratory becomes overburdened from the project samples or from samples from unrelated projects, then the daily samples can be sent to the secondary laboratory until the overburden situation passes. Also, the laboratory contracts should have performance clauses for both quality and time lines. Again, monetary penalties can be imposed for nonperformance.

B. STAFFING AND PERSONNEL MANAGEMENT

1. Conclusions

a. One of the negative aspects to the NCBC Demonstration Project was the lack of knowledge about rotary kiln incineration systems by Project Management (EG&G Idaho), the Air Force, and even ENSCO personnel.

b. Other areas to consider are the personnel knowledge of the compliance regulations, document preparation, and experience in data tracking.

2. Recommendations

a. It is recommended that the project have trained and experienced professionals in remediation technology, regulatory compliance, documentation systems, and data tracking. Regulatory compliance is an area that requires careful planning by several professionals trained in the environmental regulations. These regulations are too cumbersome for one person to know and keep up with so it will require several people, each with an expertise in some area.

b. The professionals writing the permits, applications, Environmental Assessments, etc., must have had at least some training and experience in these areas. It is not wise to think that any one person can prepare these documents. Document preparation and approval would be expected by employing highly trained and experienced professionals.

c. Data tracking for the NCBC Demonstration Project was inadequate for a project of this size. The data tracking at the NCBC was primarily handled by a clerk that had little training on the database used for tracking. The clerk could enter numbers and other pertinent information into the system but had no knowledge concerning the data's quality. A trained professional could have spotted unusual or erroneous data and questioned it prior to entering the data in the database. Such actions would have saved time and money by not having to enter the data a second time and redoing the entire database.

C. SITE SERVICES

1. Conclusions

One service that was almost totally lacking on the NCBC project was a parts/tool crib person. All of the operations and excavation personnel had access to the parts and tools so items tended to disappear. A lot of the hand tools would show up out in the field, or in a bucket of contaminated soil, or quite possibly in the shredder. Most of the workers were very nonchalant about the hand tools and just left them where they were used.

One of ENSCO's better accomplishments was to hire a full-time purchaser/expeditor. Rather than having several people trying to perform the job on a part-time basis, this gave the task to one person to know what and how many of each item were ordered, who ordered it, and why it was ordered. The purchaser/expeditor also negotiated for the small rental items that were used periodically throughout the project.

2. Recommendations

Having one person in charge of and stationed at the tool crib could prevent the unlimited use of the tools by checking the tools out to an individual or the individual's supervisor. Additional tools could not be checked out until the first tools were returned. This person would also be in charge of the rented equipment such as hydraulic jacks, chainsaws, string trimmers, and the hand and bath towels. Bath and hand towels disappeared continually. Several string trimmers were stolen, and during the latter

stages of the project two hydraulic jacks and two chainsaws were stolen. Because this was a reasonably secure area on a Naval base, it is highly unlikely that Naval personnel or nonproject personnel were responsible for the disappearance of these items.

D. DATA MANAGEMENT/DOCUMENT CONTROL

1. Conclusions

Different data transmission systems were used for various types of data, depending on the turnaround time required for each particular data set. One of the most efficient methods was to use telecommunications software via computer modem to transmit the data to the EG&G Idaho office. In cases where personnel were not available to process the transmission, the data were copied to a computer disk and sent by Express Mail to the EG&G Idaho office.

When transmitting hard copy data, it was important to first determine the turnaround time needed for this data. If immediate receipt of the data was needed, then the telefax machine was used. If there was no immediate need for the data, it was transmitted by Express Mail. Most information was transmitted by Express Mail, although occasionally information was required to answer questions and was, therefore, telefaxed.

The data from the BOH soil samples were analyzed to make several determinations during the course of the project. Examples of these determinations were:

a. Predicting the quantity of soil remaining to be excavated and processed

b. The depth of cut to make during excavations

c. The composite makeup for obtaining total dioxin and total furan chemical analysis.

As analytical results were received from the laboratories, copies were made of the telefaxed data sheets with one copy being placed in the daily files and a second copy transmitted to the EG&G Idaho Project Office in Idaho Falls, Idaho. Copies of the data were also made each day on computer disks and placed in one of the fireproof files.

Although all sample data were entered into the database at the NCBC project office, the official database files were kept at the INEL. All database information was transmitted from the NCBC to the INEL via a computer modem telecommunication system. At the INEL, the information contained in the database was validated by the EG&G Idaho Data Manager as part of quality control by comparing 10 percent of the entries against the hard copy (chain of custody) received from the laboratory. Any discrepancies were corrected on the official database at the INEL and then transmitted back to the NCBC project office via the computer modem.

The database information was also spot checked periodically during the project by the EG&G Idaho Program Coordinator and given a thorough review by the Program Coordinator and Data Manager at the completion of the project.

2. Recommendations

Some discussion was presented here on the data management methods used at the NCBC, but this is not necessarily the recommended system. A more economical, and certainly more efficient system, is to maintain only one set of data and have that at the project site. This would eliminate the daily expense of telefaxing the analytical data to the home office and then express mailing copies of the same data. It could, quite possibly, also eliminate the need for a separate data entry clerk, as the Data Manager could enter the data.

When the database information was needed at the home office, a copy of the database could be printed and mailed. If a more expedient response is desired, the option to transmit the database via the computer modem is still available.

A second recommendation for future projects would be to use a bar-coding system for data collection. The process is simple and eliminates several potential areas for errors. A bar-coding system can be set up and operated at a minimal cost.

Bar coding is an excellent environmental tracking tool in that using a "check digit" at the end of the bar code ensures accuracy to one error in a million. Compared to the one error in 38 that is generally figured for the average data input clerk, this is a significant increase in accuracy.

The process would be used to its maximum efficiency by starting the process out in the field with the sampler printing and attaching the appropriate sample label off of their portable, belt-attachment, bar-code printer. The sample jars would then be scanned by the personnel preparing them for shipping, with this information being easily uploaded to a database on a standard PC system. A chain-of-custody form could then be automatically and accurately printed from the data in the database. Most of the laboratories currently use bar coding and the DOD has standardized a symbology for printing the bar codes.

Bar coding eliminates the need for a data entry clerk and it also enables the sampler to be able to clearly and accurately label the sample jar in the field, thus cutting down on further chances for bottle and label mix-up and the possibility of the sampler transposing information.

The cost of bar coding equipment, labels, software, etc., is generally reasonable and could pay for itself quite rapidly, depending on the application. Many brands of bar coding equipment are built to handle the harshest of environments for data collection and input.

E. RECORDS MANAGEMENT

1. Conclusions

Upon completion of the soil processing at the NCBC, all of the daily records that had been on file in the fireproof files at the site office were repackaged into file boxes and shipped to the EG&G Idaho main office at the

INEL. At the INEL, these files were assigned file numbers, catalogued, and the catalogued information was entered on a computer database. In addition to the daily records from the project site, all of the project data generated at the INEL from the management side and/or the chemical analysis evaluation side were handled similarly. The documents from this project will be stored per EPA regulations for records detention.

2. Recommendations

In retrospect, it would have been beneficial to a project of this magnitude to set up the project file numbers and cataloguing before the start of the project. It is much more time consuming to initiate this process at the end of the project. Another reason for initiating a document management system at the beginning of a project is to make a determination on whether to microfilm all documents to save space. It would be extremely expensive to make that decision after all the documents have been generated.

SECTION VIII
REFERENCES

1. Crockett, A.B., Propp, A., and Kimes, T., Herbicide Orange Site Characterization Study Naval Construction Battalion Center, ESL-TR-86-21, Headquarters, Air Force Engineering and Services Center, Tyndall Air Force Base, Florida, April 1987.

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3. Deiro, S.W., Full-Scale Incinerator System Demonstration at the Naval Construction Battalion Center, Gulfport, Mississippi, Volume VI: Soil Excavation, ESL-TR-89-39, Headquarters, Air Force Engineering and Services Center, Tyndall Air Force Base, Florida, (in press).

4. Cook, J.A., Full-Scale Incinerator System Demonstration at the Naval Construction Battalion Center, Gulfport, Mississippi, Volume V: Incinerator Availability for the USAF Installation Restoration Program, ESL-TR-89-39, Headquarters, Air Force Engineering and Services Center, Tyndall Air Force Base, Florida, (in press).

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6. Haley, D.J., Full-Scale Incinerator System Demonstration at the Naval Construction Battalion Center, Gulfport, Mississippi, Volume III: Trial Burns for the USAF Installation Restoration Program, ESL-TR-89-39, Headquarters, Air Force Engineering and Services Center, Tyndall Air Force Base, Florida, (in press).

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN, ENVIRONMENTAL RESTORATION TECHNOLOGY STUDY FOR THE NAVAL CONSTRUCTION BATTALION CENTER (NCBC) GULFPORT, MISSISSIPPI

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QUALITY ASSURANCE PROJECT PLAN, ENVIRONMENTAL

RESTORATION TECHNOLOGY STUDY FOR THE

NAVAL CONSTRUCTION BATTALION CENTER (NCBC)

GULFPORT, MISS.

Introduction

EG&G Environmental Restoration Programs Department (ERPD) and the Hazardous Waste Projects Group (HWP), Quality Assurance Activities for Environmental Restoration Technology Study of the NCBC are governed by:

- EG&G Quality Manual
- Quality Program Plan (QPP-053)
- Individual QA Plans and/or procedures from subcontractors performing sampling and sample analysis

Major activities presently included are:

To conduct investigations, prepare plans, conduct sampling and analysis of the facility to demonstrate the feasibility of employing selected Environmental Restoration Technologies, both pilot and full scale for the clean up/restoration of the site.

The EG&G Quality Manual and the WMPD Quality Program Plan (QPP-053) meet the applicable ANSI/ASME NQA-1-1986 and Department of Energy (DOE) Quality requirements for the HWP Unit. This QAPP identifies the Quality controls that are applicable to EG&G.

More specifically, the objectives of the QA Program are to:

- Assure the Quality of each analytical system, including precision accuracy and sensitivity sufficient for the needs of this project.
- Assist in the early recognition of deficiencies which might affect the Quality of data.
- Assure that the contractor laboratory identifies and implement actions that are necessary to ensure the validity of laboratory data.
- Require sufficient documentation to verify the Quality of data submitted.
- Assure operational requirements as specified in the EPA RCRA RD&D permit are adhered to.

1.0 SCOPE

This QAPP addresses those elements which will be required to ensure that proper Quality Control/Quality Assurance will be maintained throughout the implementation of the Environmental Restoration Technology Study.

2.0 RESPONSIBILITIES AND AUTHORITIES

2.1 The EG&G Environmental Restoration Programs Department (ERPD) has prime responsibility and authority for the Quality of data collected in support of the Environmental Restoration Technology Study for the NCBC. This responsibility is delegated to the HWP Group and they are responsible for the preparation, revision and implementation of this QA Plan which invokes the 16 elements in accordance with the Interim Guidelines and Specifications for preparing QA Project Plans, document QAMS-005/80 which was prepared by the Environmental Protection Agency (EPA).

2.2 The HWP Group is responsible for:

- o Reviewing and concurring with procedures on activities performed by EG&G and subcontractors of EG&G.
- o Determining requirements and means for compliance and implementation.
- o Performing periodic surveillance of all environmental monitoring, operational and sampling activities at NCBC.
- o Issuing surveillance reports and corrective action reports of monitoring activities as required.
- o Evaluating and interpreting data for monitoring and surveillance activities.
- o Maintaining cognizance of existing and pending orders, rules, laws and regulations affecting this activity.

2.3 EG&G Safety is responsible for:

- o Auditing the work process and workplace for prevention of accident loss, personnel health and safety.
- o Report findings and recommendations to the EG&G Project Manager.

2.4 The Quality Organization is responsible for:

- o Reviewing and concurring with subcontractors field sampling QAP's and/or sampling procedures.
- o Performing inspection and surveillances and witnessing tests and instrument calibrations during the sampling program, as requested by the EG&G Project Manager.
- o Issuing reports and corrective actions relating to performance of monitoring activities.
- o Reviewing procedures and documents for inclusion of Quality requirements.

3.0 FIELD SAMPLING PLAN REQUIREMENTS

This QAPP is the definitive document invoking the QA requirements for the NCBC Environmental Restoration Technology Study. The Field Sampling Plans and Operational Procedures to accomplish this task will be provided by others.

3.1 Organization

The structure of the organization shall be established so that the levels of authority, functional responsibilities, and lines of communication are clearly evident to all participants in the organization.

The organization and responsibilities to authorize, establish, approve, and perform are described in section 2 of this plan. Key individuals responsible for the Quality of sampling activities are to be identified in the Field Sampling Plan.

3.2 Program Description

Each Field Sampling Plan shall ensure that all quantitative and qualitative data reported to EG&G are of known and acceptable accuracy and precision as prescribed by validated requirements described in Document QAMS-005/80.

The Field Sampling Plan shall include documentation of sampling activities so that the quality, effectiveness and results of the activities can be evaluated by independent agencies having a working knowledge of the activities.

Operations guidelines, procedures, and descriptions shall be used to document the operation aspects of the NCBC Program. All discrepancies during operation will be reported to EG&G for final correction.

The Field Sampling Plans shall include:

- Performance of sampling activities in accordance with written procedures.
- Quantitative measurement of all sampling systems using accurate and calibrated measurement equipment, when applicable.
- Qualitative analysis of all sampling using EPA approved procedures for analysis, qualified analysts and accurate, calibrated analysis equipment.
- Qualitative and quantitative methods of sampling regimes to be used for specific site characterizations.
- Periodic internal surveillance of analysis equipment and methods through the use of known quantity samples.
- A document control system wherein records, data and reports are controlled to ensure validity and allow verification of accuracy, precision and reliability of sampling activities.
- A sampling program using EPA approved quality control measures or procedures for preparation, collection, identification and handling of samples, and chain-of-custody procedures.
- A corrective-action system whereby procedural noncompliance may be effectively corrected in a timely manner.

3.3 QA Objectives

The objectives of the QA sampling activities shall be the qualitative determination and quantitative measurement of all information on the NCBC Site. The accuracy of the information should meet or exceed the requirements of EPA regulations and guidelines. Specific objectives in terms of precision, accuracy and representativeness (see Definitions) shall be stated in the QA Program.

3.4 Sampling and Operational Procedures

Sampling and operational activities associated with the NCBC Site shall be performed in accordance with approved written procedures. The procedures shall indicate sampling methods, containers and pretreatment (if any) to be used, sample preparation and handling, sample control, sample preservation, size of samples, frequency of sampling, sample identification, documentation requirements, and sampling regimes.

3.5 Sample Custody

A documented chain-of-custody program shall be used to identify and trace NCBC samples from the point of collection to final analysis. Chain-of-custody procedures shall be prepared and followed by each group responsible for handling NCBC samples.

3.6 Calibration Procedures

All instruments and equipment used for quantitative and qualitative sampling, measurement and detection of materials released to the environment shall be calibrated in accordance with a documented calibration program. Calibration reference material and standards used to calibrate environmental monitoring equipment and instruments for NCBC shall be traceable to a reference standard whose accuracy is certified by the National Bureau of Standards.

3.7 Analytical Procedures

Written procedures shall be used for analysis of all environmental monitoring samples applicable to NCBC and shall delineate or reference procedures which meet or exceed in precision and accuracy of results those procedures which have been approved by EPA.

3.8 Data Reduction, Validation and Reporting

All required NCBC data shall be reported to EG&G as specified in the subcontracts and/or other applicable guidelines. The Field Sampling Plan for NCBC and the applicable procedures shall assign the responsibility for data reduction and validation. Each procedure shall include:

- o The sampling methods used to characterize sites.
- o The data reduction scheme that includes all equations used to obtain the reporting units.
- o The criteria used to validate data.
- o Methods used to identify and treat outliers.
- o Confidence limits for sampling methods and analysis.
- o A flowchart indicating the entire data reporting scheme.

The HWP Unit shall ensure that an independent review is accomplished of all calculations used in data reduction prior to submittal to NCBC.

3.9 Document Control

The preparation, issue and change of documents that relate to NCBC project shall be controlled. Final or current documents will be on file at the NCBC site by EG&G personnel and at the INEL. Changes to documentation related to the NCBC project shall be submitted to the USAF AFESC representative for forwarding to EPA.

3.10 Internal Quality Control Checks

Periodic internal QC checks shall be included in the NCBC Field Sampling Plan for both field QC checks and laboratory QC checks. The frequency at which QC checks are done shall be determined for each area concerning NCBC. Results of the QC checks shall be reported to management in a timely manner. Known quantity samples shall be utilized.

3.11 Performance and System Audits

Performance and System audits shall be initiated for both the field and laboratory systems. The NCBC Field Sampling Plan shall include descriptions of both internal and external performance and system audits that are required to monitor the capability and performance of the entire measurement system for all NCBC activities. Scheduled and unscheduled audits shall be performed on a regular basis in order to determine accuracy and adherence to procedures. Reports to management on Performance and system audits shall be submitted in a timely manner. A system to correct and document audit findings shall be used.

3.12 Preventive Maintenance

Preventive maintenance shall be scheduled for equipment and operations for both the field and laboratory areas. Procedures shall incorporate a preventive maintenance schedule, a list of critical spare parts, and methods to ensure that the parts are continuously inspected and available.

3.13 Data Evaluation and Reporting

All NCBC measurement data shall be routinely assessed. The QA Plan and applicable procedures shall specify parameters used on a routine basis to evaluate data precision, accuracy and completeness of measurement data.

The Field Sampling Plan shall define any statistical procedures used to evaluate data, in addition to clearly defining individual laboratory confidence limits, instrument detection limits, and computer database data reduction methods (when applicable).

3.14 NCBC Activity Training

NCBC activities shall be performed by personnel who are trained for the activities. Training is mandatory for document control, sample collection, transfer (chain-of-custody), sample analysis, and for operational activities.

3.15 Corrective Action for Noncompliance

A corrective action program for operational and sampling activities shall be established to ensure that noncompliances are identified and controlled/corrected. Corrective action measures shall be clearly defined for all activities for which noncompliance with procedures is detected. Corrective action may be initiated as a result of other QC activities which indicate that a potential problem area may exist. Reports to management shall be submitted for all corrective action and training recommendations. Open corrective items will be documented in a monthly report submitted to the USAF AFESC representative.

3.16 Quality Assurance Reports to Management

Periodic reports to management on the performance of measurement systems and data quality shall be provided. As a minimum, these reports should include:

- o Results of performance audits.
- o Results of system audits.
- o Significant QC problems and recommended solutions.
- o Laboratory and field comparison studies.

The HWP Manager is responsible for insuring that QA reports are provided to management.

REFERENCES

1. W. A. Coakley, Quality Assurance Programs for Environmental Monitoring Data, June 1984.

2. Quality Assurance Program Requirements for Nuclear Facilities, ANSI/ASME NQA-1-1986 Edition.

3. Standard Operating Procedures for Conducting Sampling and Sample Bank Audits, EPA-600/4-85-003, January 1985.

4. Quality Program Plan for Waste Management Program Department, QPP-053.

5. EG&G Quality Manual.

6. Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80, EPA-600/4-83-004, Feb. 1983.

DEFINITIONS

1. AUDIT

A systematic check to determine the quality of operation of some function or activity. Audits may be of two basic types: 1) performance audits in which quantitative data are independently obtained for comparison with routinely obtained data in a measurement system, or 2) system audits of a qualitative nature that consist of an on-site review of a laboratory's quality assurance system and physical facilities for sampling, calibration and measurement.

2. DATA QUALITY

The totality of features and characteristics of data that bear on its ability to satisfy a given purpose. The characteristics of major importance are accuracy, precision, completeness, representativeness and comparability. These characteristics are defined follows:

a. Accuracy - the degree of agreement of a measurement (or an average of measurements of the same thing), X, with an accepted reference or true value, T, usually expressed as the difference between the two values, X-T, or the difference as a percentage of the reference or true value, 100 (X-T)/T, and sometimes expressed as a ratio, X/T. Accuracy is a measure of the bias in a system.

b. Precision - A measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation. Various measures of precision exist depending upon the "prescribed similar condition."

c. Representativeness - expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

d. Comparability - expresses the confidence with which one data set can be compared to another.

3. DATA VALIDATION

A systematic process for reviewing a body of data against a set of criteria to provide assurance that the data are adequate for their intended use. Data validation consists of data editing, screening, checking, auditing, verification, certification and review.

4. ENVIRONMENTALLY RELATED MEASUREMENTS

A term used to describe essentially all field and laboratory investigations that generate data involving 1) the measurement of chemical, physical, or biological parameters in the environment, 2) the determination of the presence or absence of criteria or priority pollutants in waste streams, 3) assessment of health and ecological effect studies, 4) conduct of clinical and epidemiological investigations, 5) performance of engineering and process evaluations, 6) study of laboratory simulation of environmental events, and 7) study or measurement on pollutant transport and fate, including diffusion models.

5. PERFORMANCE AUDITS

Procedures used to determine quantitatively the accuracy of the total measurement system or component parts thereof.

6. QUALITY ASSURANCE

The total integrated program for ensuring the reliability of monitoring and measurement data. A system for integrating the quality planning, quality assessment, and quality improvement efforts to meet user requirements.

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APPENDIX B

SAMPLE SUBCONTRACT
PROFESSIONAL SERVICES AGREEMENT

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SAMPLE SUBCONTRACT
PROFESSIONAL SERVICES AGREEMENT

A. WORK TO BE PERFORMED

1. The Contractor shall furnish the necessary personnel, equipment, materials, services, facilities, and otherwise do all things necessary for or incident to the performance of the work at the (location) (hereafter designated as the "Site") as set forth in:

a. Amended Schedule of Payments (Attachment 1).

b. This Contract.

B. TREATMENT AND PAYMENT

1. The ceiling price for all work to be performed under this contract, consisting of mobilization, a trial burn, the "treatment" [as that term is defined in Subparagraphs B(3), B(6)(h) and B(7)(d)], of (XXX) tons of contaminated soil and sludge, (XXX) gallons of contaminated liquids and (XXX) drums of contaminated waste, restoration of the Site, payment of fuel utilized by the incinerator, all in accordance with and subject to the cost categories and amounts set forth below, shall be an amount not to exceed ($XXX).

2. Payment for Mobilization

a. The (Government, Contractor) shall, subject to the provisions set forth in Subparagraph B(2)(c-d) below, make a payment to the Subcontractor in the sum of ($XXX) upon receipt of notification from the Contractor that all of the initial activities described in Subparagraph 3(a-g) have been completed.

b. The (Government, Customer, Contractor) reserves the right, prior to payment under Subparagraph 2(a) above, to have its project coordinator visit the Site and verify whether the initial activities have been completed.

c. In the event the Government exercises its rights pursuant to Subparagraph 2(b) above and there is a disagreement between the (Government,

Contractor) and the Subcontractor as to whether the initial activities have been completed, the (Government's, Contractor's) determination shall control.

d. The Subcontractor agrees that completion of the initial activities shall occur at the Site on or before (date). In the event completion of the initial activities does not occur on or before (date), the (Government's, Contractor's) agreement to pay the Subcontractor pursuant to Subparagraph (2)(a) above shall lapse. In the event the Subcontractor shall fail to complete the initial activities by (date), such failure shall constitute a substantial failure of the Subcontractor to fulfill its obligations under this contract and subparagraphs (specifying termination for reasons of default) shall become effective.

3. Initial Activities: The initial activities are comprised of all those activities necessary to prepare the Site to receive the incinerator, to mobilize the incinerator onsite, to take all actions necessary or appropriate prior to the initiation of the trial burn, and includes but is not limited to the activities set forth in Subparagraphs 3(a-g) below. All of the costs, both direct and indirect, arising out of or as a result of the initial activities of the Subcontractor, are incorporated in their entirety in the treatment costs for contaminated soils, sludges, liquids, and drums set forth in the Amended Schedule of Payments (Attachment 1).

a. Design of equipment foundations, waste storage system, stormwater runoff provisions, etc.

b. Site preparation including pad preparation, grading, installation of security fences, construction of a decontamination area, construction of water and wastewater containments, and provision for personnel and service trailers, materials and equipment storage area, etc.

c. Mobilizing the incinerator onsite, including all requisite equipment and trailers, and satisfactorily connecting all components of the incinerator system and associated equipment and trailers, including but not limited to the control room and air pollution control and monitoring equipment.

d. Utility tie-ins as required.

e. Supplying water to the Site in sufficient quantity and quality to meet all of the Subcontractor's operational demands.

f. Onsite training and certification of operators in safety, security, and equipment operation procedures.

g. Site security prior to the start of operation of the incinerator.

4. Treatment of Contaminated Soils and Sludges: The treatment of contaminated soils and sludges shall be comprised of all activities beginning with excavation of the contaminated soils and sludges and concluding with backfilling the incinerated residues, and shall include but not be limited to the following:

a. Site excavation.

b. Waste storage, including protection and containment of exposed materials.

c. Waste preparation as required.

d. Incineration of contaminated soils and sludges.

(1) All soils and sludges, after incineration, shall contain no more than (XXX ppm cumulative of PCBs, XXX ppb 2,3,7,8-TCDD, or _____) and organic priority pollutants (hereafter sometimes referred to as the "cleanup objective") in order to be deemed incinerated, provided that the soils and sludges, prior to incineration, shall have contained not more than (XXX ppm cumulative of PCBs, XXX pnb 2,3,7,8-TCDD, or _____), and organic priority pollutants. In the event the soils and sludges prior to incineration contain a level of contamination in excess of (XXX) ppm cumulative of PCBs, (XXX) ppb 2,3,7,8-TCDD, or _____) and organic priority pollutants, the soils and sludges after incineration shall contain the lesser of [(a) 2 ppm or less of each organic priority pollutant and PCB, (b) a 10,000-fold reduction for each

organic priority pollutant and PCB, or (c) _____] in order to achieve the cleanup objective and be deemed incinerated.

(2) Any soils and sludges not meeting the cleanup objective shall be put through the incineration process again until such time as they meet the cleanup objective.

(3) The cost for the reincineration process described immediately above shall be borne solely by the Subcontractor.

e. The cost of incinerator and ancillary equipment and utilities (electrical power, compressed air, steam, water, etc.) with the exception of the fuel necessary to operate the incinerator.

f. Effluent disposal including water used to cool soil residues, scrubber sludge, scrubber water, and decontamination water derived from onsite operations. The scrubber sludge may be mixed with ash residues and backfilled into the excavated areas onsite provided that the analysis of periodic sampling of the sludge demonstrates that it meets the established cleanup objectives. The system for collection, sampling, and analysis of the scrubber sludge and water used to cool soil residues shall be included in the Subcontractor's work plan submitted to the Government. In addition, the Subcontractor shall be responsible for the design, engineering, and implementation of a surface water drainage, collection, and containment system at the Site. (The Government shall be responsible for the treatment and/or disposal of the groundwater, perched water and surface water encountered at the Site.)

g. The costs for fire protection, firefighting, spill control, and other emergency and emergency standby procedures that may be required.

h. Supplying water to the Site in sufficient quality and quantities to meet all of the Subcontractor's operational demands.

i. Laboratory work necessary in order to (1) comply with permit and contract conditions, (2) verify that the incinerator and ancillary equipment are functioning within acceptable operating parameters, and (3) verify ash

residues meet the established cleanup objective. (Detailed analytical specifications outlining the protocols and data format required should be placed in an appendix).

j. Air monitoring in accordance with the monitoring plan to be approved by the (Government, Contractor).

k. Site safety and security.

l. Backfilling of treated soils and sludges.

All the activities listed in Subparagraph 4 may hereafter be referred to sometimes as "treatment" of the soils and sludges or as the "work."

5. Payment for Treatment of Soils and Sludges

a. The treatment cost for all soils and sludges located at the Site shall be at the unit price per ton of soil and sludge set forth in Item 2d of the Amended Schedule of Payments (Attachment 1). The (Government, Contractor) recognizes and acknowledges that the waste quantities described in Item 2d of the Amended Schedule of Payments are set forth on a cumulative basis.

b. It is recognized that although Subparagraph B(1) of this agreement envisions the treatment of (XXX) tons of soils and sludges, this amount is not guaranteed by the (Government, Contractor). The (Government, Contractor) reserves the right to direct the Subcontractor to treat up to (XXX) tons.

c. The (Government, Contractor) and Subcontractor recognize and acknowledge the total cumulative amount of soils and sludges to be treated at the Site can only be an approximation until the treatment of all contaminated soils and sludges at the Site is completed. Until completion of treatment of all soils and sludges at the Site, the Subcontractor shall be paid at the unit rate of $(XXX) per ton of treated soil and sludge. It is hereby understood and agreed that within 30 days after completion of the treatment of all soils and sludges at the Site, the Subcontractor shall notify the Government of the final amount of soils and sludges that were treated and an adjustment of the unit price per treated tons of soils and sludges shall be calculated by the

Subcontractor based upon the unit prices contained in Item 2d of the Amended Schedule of Payments. In the event the cumulative quantity of treated soils and sludges falls between the bracketed levels set forth in Item 2d of the Amended Schedule of Payments, the price for the cumulative quantity shall be extrapolated linearly based upon the unit prices. Payment of the final amount due either the Subcontractor or the Government based upon the adjusted unit price shall occur at the final settlement described in Subparagraph B(12) of this contract.

d. Quantity measurements of soils and sludges shall be based on the weight of waste quantities after the waste has been prepared and staged for incineration but prior to actual incineration. Measurement of bulk waste quantities shall be made by weighing the waste on a calibrated scale with automatic printout. The Subcontractor shall provide this scale that shall be certified and readily calibrated. The weight ticket shall include date, time, gross weight, and tare and net weight, all printed and recorded on the receipt. Receipts shall be acknowledged by and submitted to the (Government, Contractor). Payment will be made only upon recording of these receipts by the (Government, Contractor).

e. It is understood and agreed that except for fluctuations in the Btu values of the soils described in Subparagraph f below, the Amended Schedule of Payments (Attachment 1) represents the entire cost obligation of the (Government, Contractor) to the Subcontractor for the treatment of soils and sludges in any amount between (XXX) tons and (XXX) tons. In the event the regulatory agency requests the (Government, Contractor) to treat soil and sludges in excess of (XXX) tons, the (Government, Contractor) and the agency shall negotiate in good faith to arrive at a unit price acceptable to both parties. In the event the (Government, Contractor) and the regulatory agency are unable to arrive at a unit price acceptable to both parties, the Subcontractor shall not be obligated to treat soils and sludges in excess of (XXX) tons.

f. High Btu Soils and Sludges

(1) The Amended Schedule of Payments (Attachment 1) is premised upon an assumed Btu rating of (XXX) Btu/lb of soils and sludges or less. In

the event certain soils and sludges exceed (XXX) Btu/lb (hereafter sometimes referred to as "high Btu waste"), the Subcontractor shall attempt to blend the high Btu wastes with soils and sludges having a lower Btu value thereby reducing the overall Btu value of the materials to (XXX) Btu/lb or less.

(2) Subject to Subparagraphs 5(f)(3-4) below, in the event the Subcontractor is unable to reduce the Btu value of the waste to (XXX) Btu/lb or less by blending of the soils and sludges, the Subcontractor and (Government, Contractor) agree to negotiate in good faith to arrive at an acceptable unit cost for the treatment of said high Btu wastes.

(3) The Subcontractor reserves the right to refuse to incinerate all or a portion of soils and sludges in excess of (XXX) Btu/lb and agrees that it will cooperate with the (Government, Contractor) in the disposal of said materials by an alternate method.

(4) The (Government, Contractor) reserves the right to have all or a portion of soils and sludges in excess of (XXX) Btu/lb treated or disposed of in a manner other than onsite incineration. In the event the Government chooses a method of treatment of disposition other than onsite incineration, the (Government, Contractor) shall attempt, in good faith, to treat or dispose of the soils and sludges in a way that will not interfere with or otherwise impede the Subcontractor's work at the Site.

6. Treatment, Disposal, and Payment of Drums

a. The treatment of all drums and the contents therein (hereafter referred to as "drums") presently known to exist onsite shall be accomplished in the manner hereafter set forth at the unit price of ($XXX) per drum.

b. The Subcontractor shall review the data on the analysis of each drum previously sampled by the Government to ensure safe handling and economical waste preparation.

c. The Subcontractor shall perform an analysis for Btu moisture content and halogen content and shall perform an analysis on all drums subsequently discovered in order to ensure suitability for incineration and compatibility for purposes of blending with other wastes present at the Site.

d. The treatment of all drums subsequently discovered shall be at the unit price of ($XXX) per drum provided the drums contain constituents comparable to the constituents in existing drums. In the event the constituents of the subsequently discovered drums are not comparable, the Subcontractor, prior to treatment of said drums, shall submit a quotation to the Government for the cost of treatment. If the Government finds the quotation unacceptable, the (Government, Contractor) reserves the right to select an alternate treatment or disposal method.

e. Contents of all drums shall be staged and incinerated in accordance with the Subcontractor's approved work plan.

f. Emptied drums shall be cut up with shears or other cutting devices and incinerated.

g. Metal pieces, after incineration, shall be placed (specify disposal location).

h. All of the activities set forth in Subparagraph B(4) that pertain to the drums as well as the activities set forth in Subparagraph B(6)(b-g) may hereafter be referred to as the "treatment" of the drums.

7. Treatment and Payment of Liquid Contaminated Waste

a. The treatment of contaminated liquids shall be comprised of the following:

(1) Removal of liquid wastes from the tanks located on the Site.

(2) All analytical work necessary in order to ensure proper incineration.

(3) Preparation of the liquids for incineration.

(4) Incineration of the liquids.

b. The treatment cost for all liquid contaminated waste shall be at the unit price per gallon of ($XXX) up to (XXX) gallons.

c. In the event additional liquid contaminated waste shall require incineration, the cost shall be per gallon, provided that the discovery of the additional contaminated liquid and the authorization from the (Government, Contractor) to the Subcontractor to incinerate the additional contaminated liquids occurs soon enough to permit the incineration of the liquids and the existing soil and sludges to occur concurrently.

d. All of the activities set forth in Subparagraph B(4) that pertain to the contaminated liquids as well as the activities set forth in Subparagraph B(7)(a) may hereafter be referred to as the "treatment" of the contaminated liquids.

8. Site Restoration. The Contractor shall restore the Site at the conclusion of remediation. The Site restoration shall include but need not be limited to the following:

a. Removal of incinerator and ancillary equipment.

b. Removal of all utility connections in a manner approved by the utility and the (Government, Contractor).

c. Removal of all Subcontractor trailers from the Site.

d. Removal of all tanks and containers placed at the Site by the Subcontractor and all other structures above grade placed onsite by the (Government, Contractor) except for such structures that the (Government, Contractor) requests be left at the Site.

e. The excavation area shall be graded to a free-draining condition.

9. Incinerator Fuel Oil

a. The Subcontractor intends to use either natural gas or No. 2 fuel oil as its primary fuel in the operation of the incinerator. The Contractor may utilize an alternate type of fuel provided written approval by the (Government, Contractor) shall be first obtained. The fuel shall be treated as a direct cost of the Subcontractor and the (Government, Contractor) shall reimburse the Subcontractor for the amount of fuel the Subcontractor shall use in the treatment of soils, sludges, drums, and liquids. The reimbursement to the Subcontractor by the (Government, Contractor) shall be for the exact amount the Subcontractor expends for the purchase of fuel, with no markup to the Subcontractor.

b. The (Government, Contractor) shall reimburse the Subcontractor on a bimonthly basis for the amount of fuel the Subcontractor receives from its supplier. Upon termination of remediation at the Site, the Subcontractor shall notify the (Government, Contractor) of the fuel remaining at the Site and shall credit the (Government, Contractor) for said amount in the final accounting it shall render to the (Government, Contractor) pursuant to Subparagraph B(12).

c. The (Government, Contractor) reserves the right both to approve the supplier that supplies fuel to the Subcontractor and/or provide the fuel to the Subcontractor itself or through a designated agent.

10. Additional Work

a. The (Government's, Contractor's) Project Coordinator or alternate may be subject to the limitations set forth below and authorize the Subcontractor to perform additional work at the Site in accordance with prenegotiated Rate Schedules described in Attachment (XXX).

b. The Subcontractor is not authorized to proceed with any additional work, without being in receipt of a written change order(s) executed by the (Government's, Contractor's) Project Coordinator or alternate, which change order(s) shall not exceed the amounts set forth in Subparagraphs c-e below.

c. The Project Coordinator shall not authorize additional work nor execute a change order for additional work in excess of ($XXX).

d. The alternate may neither authorize additional work nor execute a change order for additional work in excess of $10,000.

e. All change orders for an amount in excess of $10,000 must be executed by the (specify).

11. Invoices

a. Payments shall be made by the (Government, Contractor) based upon invoices from the Subcontractor detailing the portion of the work

represented by the invoice completed in accordance with the requirements of this contract.

b. The Subcontractor shall submit invoices to: (specify billing address).

12. Final Accounting

a. The Subcontractor shall, upon completion of remediation of the Site, certify in writing that remediation is completed. The (Government, Contractor) shall, through the Project Coordinator, verify that remediation is completed by acknowledging completion on the Subcontractor's certification.

b. Within thirty (30) days after the Government's acknowledgment of completion of remediation, a final accounting shall be submitted by the Subcontractor to the (Government, Contractor) containing the total tonnage of contaminated soils and sludges treated, total drums and contaminated liquids treated, and other data as are relevant to the final computation of the balance due to either the Subcontractor or the (Government, Contractor). Upon concurrence of the (Government, Contractor) with the final computation, a final settlement between the (Government, Contractor) and the Subcontractor shall occur.

C. SUBMISSION OF PLANS

1. The Subcontractor shall provide the following described plans to the (Government, Contractor) concurrently with execution of the contract:

a. Detailed Work Plan (including air monitoring plan and personnel management chart indicating key personnel responsible for implementation of the initial activities and daily operations).

b. Site Health and Safety Plan meeting at least the requirements set forth in the Sample Site Safety Plan as attached in Attachment (XXX).

c. Quality Assurance Project Plan - The Subcontractor shall use quality assurance, quality control, and chain-of-custody procedures in accordance with or comparable to "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," QAMS-005/80, U.S. Environmental Protection Agency (EPA), December 1980; and "NEIC Policies and Procedures," EPA-330/9-78-00I-R, Revised 1983; or other procedures approved by EPA.

d. Site Security Plan

e. Site Restoration Plan

2. The plans described in C(1)(a-e) above shall contain the information requested in connection with the plans called for in Section (XXX) of the Scope of Work in Attachment (XXX).

3. The Subcontractor shall not initiate any work at the Site until all of the above described plans have been approved by the Government.

D. RETENTION

1. The Government shall withhold ten percent (10%) of all payments made to the Subcontractor under this agreement, except for payments made to the Contractor pursuant to Subparagraph B(9) of this agreement.

2. All amounts retained by the (Government. Contractor) shall be included in the final computation presented by the Subcontractor to the (Government, Contractor) pursuant to Subparagraph B(12)(b) and resolved in the final settlement described in said paragraph.

E. CONTRACT PERIOD

This contract shall be in effect from the date of execution through (specify date).

F. Permits

The Contractor is responsible for obtaining all necessary State and local permits, approvals, licenses, and consents, including but not limited to the following:

- Construction Permit
- Operation permit
- Development permit
- National Pollutant Discharge Elimination System (NPDES) (if applicable) and sewer connection permit
- Discharge permit (if applicable).

On and after the date of issuance of the construction permit (specify), the Subcontractor shall neither add nor replace any portion of the incineration system that in the (Government, Contractor) judgment would adversely affect any of the operating parameters set forth in the (Construction, Development, and Operating) permits without first obtaining the written consent of the (Government, Contractor). The (Government, Contractor) may, at its discretion, require additional testing, including but not limited to a trial burn, all at Contractor's expense, to verify or substantiate the performance of the added or replaced equipment, as well as verify the performance of the incineration system with the new or replaced equipment in place.

G. TERMINATION

1. In the event the Subcontractor shall fail to file all applications for requisite permits, approvals, waivers, licenses, and consents required to implement the work within 45 days from the date of execution hereof, such failure shall constitute a failure of the Contractor to fulfill its contractual obligations and this Contract may be terminated by the (Government, Contractor). In such event, upon notice of termination by the (Government, Contractor) to the Subcontractor in writing by certified mail (return receipt requested), any mobilization payments heretofore made by the (Government, Contractor) to the Contractor shall be immediately reimbursed in full to the Government.

2. Termination for Convenience

a. This contract may be terminated in whole or in part by the (Government, Contractor) for its convenience, provided that the Subcontractor is given (a) not less than ten (10) calendar days written notice (delivered by certified mail, return receipt requested) of intent to terminate, and (b) an opportunity for consultation with the (Government, Contractor) prior to termination.

b. In the event the (Government, Contractor) shall terminate this agreement for convenience prior to completion of the initial activities, the Government shall pay the Contractor in accordance with Subparagraph (b)(1-3) below, which payment shall constitute full satisfaction of any and all obligations of the Government to the Subcontractor under this agreement.

(1) The notice of termination on or before (date of execution + XXX days)--$1,000.

(2) The notice of termination on or before (date of execution + XXX days)--$5,000.

(3) The notice of termination on or before (date of execution + XXX days)--Completion of initial activities--$15,000.

c. In the event the Subcontractor has completed the initial activities at the Site; has obtained all requisite permits, approvals, waivers, licenses, and consents required to implement the work; is in compliance with all Federal and State regulatory requirements for operation of the incinerator at a throughput rate of not less than (XXX) pounds per hour; and has treated less than (XXX) tons of contaminated soils and sludges, and the (Government, Contractor) elects to terminate this agreement for convenience, the (Government, Contractor) shall pay the Subcontractor a sum equal to the greater of either (a) the amount of soils and sludges treated by the Subcontractor at the unit rate of (XXX) per ton, plus the drums and liquids treated at the rates set forth in the Amended Schedule of Payment (Attachment 1), or (b) (specify).

d. In the event the Subcontractor has completed the initial activities at the Site; has obtained all requisite permits, approvals, waivers, licenses and consents required to implement the work; is in compliance with all Federal and State regulatory requirements for operation of the incinerator at a throughput rate of not less than (XXX) pounds per hour and has treated (XXX) tons or more of contaminated soils and sludges; and the Government elects to terminate this agreement for convenience, the Government shall pay the Subcontractor in accordance with the Amended Schedule of Payments (Attachment 1) for all soils, sludges, drums, and liquids treated.

3. Termination--Throughput Failure

a. In the event that subsequent to completion of the initial activities the results of the trial burn dictate that the incinerator may only operate at a throughput rate of less than (XXX) pounds per hour and the Subcontractor is unable to increase contaminated material throughput to at least (XXX) pounds per hour within 60 days from the date of mobilization, the (Government, Contractor) may terminate this agreement by notification to the Subcontractor of its intention to do so (delivered by certified mail, return receipt requested).

b. In the event the (Government, Contractor) elects to terminate this agreement in accordance with Subparagraph 3(a) above, the

(Government, Contractor) shall pay the Subcontractor an amount equal to the dollar amount derived by deducting (b)(2) from (b)(1) as described below:

(1) The amount of soils and sludges treated at the unit rate of (XXX) per ton regardless of the aggregate amount of contaminated soils and sludges actually treated by the Subcontractor and notwithstanding anything in Subparagraph B(5) and the Amended Schedule of Payments to the contrary, and liquids and drums at the unit rates set forth in the Amended Schedule of Payments.

(2) Less $98,000 whether or not that amount has been heretofore advanced to the Subcontractor by the (Government, Contractor).

(3) In the event the above calculation renders a negative balance, then no amount shall be due either the (Government, Contractor) or the Subcontractor.

4. Termination for Cause--In the event the Subcontractor shall fail to complete the initial activities as set forth in Subparagraph B(3)(a-g) on or before (date), fail to complete the work in a timely and expeditious manner, cease implementation of the work at any time prior to completion thereof, or otherwise act or fail to act in such a manner as to constitute substantial failure of the Subcontractor to fulfill its obligations under this subcontract, the (Government, Contractor) may terminate this subcontract by so notifying the Subcontractor in writing by certified mail, return receipt requested.

5. Upon termination under Subparagraph 4 above, the Government may take over the work and find another party to complete the work under this contract. In such event, the Subcontractor shall be liable for an amount equal to the difference between the contract price for performance of the work under this agreement and the costs incurred by the (Government, Contractor) in having the work performed by another Subcontractor. In addition, the Subcontractor shall be liable for an amount equal to the costs incurred by the (Government, Contractor) in procuring the services of the second Subcontractor. For purposes of this subparagraph, completion of the work shall be defined as the treatment of (XXX) tons of contaminated soils and sludges, (XXX) drums, and

(XXX) gallons of contaminated liquids located in tanks onsite together with the other items of work to be performed by the Subcontractor described or referred to in Subparagraph B(1).

6. In the event of termination for cause pursuant to Subparagraph G(4) above, the Subcontractor shall be entitled to receive payment for the treatment of soils and sludges at the unit rate of (XXX) per ton, regardless of the aggregate amount of contaminated soils and sludges actually treated by the Subcontractor and notwithstanding anything in Subparagraph B(5) and the Amended Schedule of Payments to the contrary. All amounts earned by the Subcontractor but not disbursed by the Government, as well as all amounts retained by the Government pursuant to Paragraph G, shall be applied to the costs incurred by the Government to complete the work pursuant to Subparagraph G(5) above.

7. Upon receipt of a notice of termination arising under Subparagraphs (G)(1-4) above, the Subcontractor shall (a) promptly discontinue all affected work (unless the notice directs otherwise), and (b) deliver or otherwise make available to the (Government, Contractor) all data, drawings, specifications, reports, estimates, summaries, and such other information and materials as may have been accumulated by the Subcontractor in performing this contract, whether completed or in process.

H. PROJECT COORDINATORS

1. The (Government, Contractor) and the Subcontractor have each designated a Project Coordinator and an Alternate Project Coordinator for this project. The Government and the Subcontractor can change their respective project coordinators or alternate project coordinators by notifying the other party in writing.

2. The (Government's, Contractor's) Project Coordinator is responsible for observing and overseeing for the Government the implementation of the work. The Subcontractor's Project Coordinator shall be responsible for directing the day-to-day activities of the Subcontractor in the implementation of the work.

3. To the maximum extent possible, technical communications between the (Government, Contractor) and the Subcontractor shall be directed through the Project Coordinators. In addition, all documents, reports, approvals, disapprovals, and other correspondence concerning performance of the Work shall be sent by certified mail to the Project Coordinators at the addresses set forth in Subparagraph H(6) below.

4. The Government's Project Coordinator shall have the authority to change, conduct, or direct any work required by this agreement when, in the opinion of the Government's Project Coordinator, conditions at the Site may present an imminent and substantial endangerment to the public health or welfare of the environment. In the event that the Government's Project Coordinator does require cessation of the work, he or she shall retain the authority to require the Subcontractor to modify the performance of the treatment of wastes in such a fashion as to avoid or mitigate any potential imminent and substantial endangerment which the Government believes may exist.

5. To the maximum extent possible, the Subcontractor's Project Coordinator or Alternate Project Coordinator shall be present at the Site during performance of the work. In the event that the Subcontractor's Project Coordinator or Alternate Project Coordinator is unable to be present at the Site for any period of time during which work is being performed, they shall designate a Substitute Project Coordinator who shall remain at the Site during all such periods. Prior to such designation, the Subcontractor's Project Coordinator or Alternate Project Coordinator shall orally notify the Government's Project Coordinator of the identity of the Subcontractor's Substitute Project Coordinator and the Project Coordinator who will be absent from the Site.

6. The Project Coordinators for this project are as follows:

a. (Government's, Contractor's) Project Coordinator:
Name
Title
Street
City

b. (Government's, Contractor's) Alternate Project Coordinator:
Name
Title
Street
City

c. Subcontractor's Project Coordinator:
Name
Title
Street
City

d. Subcontractor's Alternate Project Coordinator:
Name
Title
Street
City

I. DISPUTES

J. AMENDMENTS

No amendment(s) to this agreement shall take effect until approved by the (Government, Contractor) and Subcontractor in writing.

K. LIABILITY OF THE GOVERNMENT AND APPROPRIATION CONTINGENCY

L. RESPONSIBILITY OF THE CONTRACTOR

1. The Subcontractor shall be responsible for the professional quality, technical accuracy, timely completion, and the coordination of all services furnished by the Subcontractor under this agreement. The (Government, Contractor) shall, without additional compensation, correct or revise any errors or deficiencies in its services.

2. The Subcontractor shall perform such services as may be necessary to accomplish the work required under this agreement, in accordance with all the terms of this agreement.

3. The Subcontractor shall obtain the written consent of the (Government, Contractor) prior to instituting any substitutions or deletions of key personnel during the performance of this agreement.

M. WARRANTY OF SUBCONTRACTOR

The Contractor expressly warrants that it has employed no third person to solicit or obtain this contract in its behalf, or to cause or procure the same to be obtained upon compensation in any way contingent, in whole or in part, upon such procurement, or in compensation for services in connection therewith, any brokerage, commission, or percentage upon the amount receivable by it hereunder; and that it has not, in estimating the subcontract price demanded by it included any sum by reason of any such brokerage, commission, or percentage; and that all monies payable to it hereunder are free from obligation to any other person for services rendered, or to have been rendered, in the procurement of this contract. It further agrees that any breach of this warranty shall constitute adequate cause for the termination of this contract by the (Government, Contractor) and that the (Government, Contractor) may retain to its own use from any sums due or to become due thereunder, any amount equal to any brokerage, commission, or percentage so paid, or agreed to be paid.

N. AUDIT AND ACCESS TO RECORDS

The Contractor's records related to work performed under this contract shall be open and available for copying to authorized auditors representing the (Government, Contractor), the regulatory agency, the U. S. Department of Labor, or the Comptroller General of the United States for a period of three years following the final completion of all work and payments required by the terms of this contract.

O. FINDINGS CONFIDENTIAL

Any reports, information, data, etc., given to or prepared or assembled by the Subcontractor under this subcontract which the Government requests to be kept confidential, shall not be made available to any individual or organization by the Subcontractor without the prior written approval of the (Government, Contractor).

P. INDEMNIFICATION

Q. INSURANCE

The Subcontractor warrants that it maintains a level of insurance that protects it against claims made against the (Government, Contractor) that arise from or are the result of the Subcontractor's implementation of the contract and encompasses actions by the Subcontractor, or other persons either directly or indirectly employed by the aforementioned. Such claims shall include but not be limited to the following:

a. Claims under workmen's compensation disability benefit and other similar employee benefit act(s).

b. Claims for damages because of bodily injury, occupational illness or disease, or death of an employee.

c. Claims for damages because of bodily injury, occupational illness or disease, or death of any person other than employees as required by applicable law.

d. Claims for damages because of injury to or destruction of tangible property, including loss of use therefrom, as applicable by law.

R. PUBLIC MEETINGS AND TESTIMONY

1. The Subcontractor agrees to have a representative acceptable to the (Government, Contractor) available to participate in public meetings and public awareness programs.

2. The Subcontractor agrees, upon the written request of the (Government, Contractor), to have a representative(s), acceptable to the (Government, Contractor), available to testify and/or provide documents in any legal action instituted by or on behalf of the (Government, Contractor) against third parties for the recovery of costs incurred by the (Government, Contractor) for work performed under this agreement.

3. The cost to the (Government, Contractor) for the Subcontractor's participation pursuant to Subparagraph (1) and (2) shall be at the rate set forth in Attachment (specify the rate schedule).

S. INFORMATION RELEASES

The Subcontractor agrees that no news releases, technical papers, or other releases of information pertaining to any aspect of the work shall be made unless prior written approval from the Government has been granted.

T. ACCESS TO SITE

The Subcontractor agrees to maintain a daily log of all persons who enter the Site for any purpose, including employees of the Subcontractor, and shall note in the log which persons entered into the contaminated areas. The log shall be submitted to the (Government, Contractor) at the conclusion of the project.

U. STUDY

The (Government, Contractor) reserves the right through itself or a designated representative to conduct studies of stack emissions emanating from the incineration system on an ongoing basis while work progresses at the Site. In the event the (Government, Contractor) elects to conduct such a study, the (Government, Contractor) agrees to the following:

1. The Government shall allow the Subcontractor to review and comment on all final data before it is published.

2. The Subcontractor shall approve of the testing company retained by the Government in order to ensure itself that the confidentiality and proprietary interests of the incineration system are not infringed upon.

3. The testing company, prior to conducting any tests, shall execute a hold-harmless agreement satisfactory to the Subcontractor releasing the

Subcontractor of liability for any injuries personnel of the testing company may sustain, except for injuries caused by the Subcontractor's negligence.

V. TRIAL BURN

1. The (Government, Contractor) has determined the necessity of a trial burn for the incinerator and associated equipment including pollution control and monitoring equipment (incineration system) prior to the initiation of remediation at the Site.

2. The Subcontractor shall, subject to the prior written approval of the (Government, Contractor), select an independent Trial Burn Contractor (TBC) to prepare a trial burn plan and implement its provisions in conjunction with the Subcontractor. The trial burn plan shall, as a minimum, incorporate the following elements:

a. Waste characteristics and analysis for solid, liquid, and semi-solid wastes including soils and sludges.

b. Waste feed rates for each type of waste.

c. Operating parameters to be monitored and recorded, including details of all methods.

d. Contaminants to be measured, including details of all sampling, analytical and quality assurance/quality control procedures.

e. Schedule of operations from initial startup of the incineration system to operation under a regulatory agency operation permit, consistent with this contract.

The trial burn plan and all protocols associated therewith shall conform to regulatory agency rules as applicable and shall be subject to the prior written approval of the agency.

3. The following phased approach shall be instituted by the Subcontractor pursuant to a construction permit issued by a regulatory agency prior to the initiation of the trial burn:

a. Phase I: The Subcontractor shall operate the incineration system utilizing uncontaminated soil and fuel oil or natural gas in order to determine that the incineration system is functioning properly.

b. Phase II: The Subcontractor shall, for a total period not to exceed 72 hours over five (5) consecutive calendar days, operate the incineration system utilizing waste materials (soils, sludges and liquids) located on the Site at a combined feed rate not to exceed (XXX) pounds per hour, in order that the incineration system may be evaluated with measurable results.

4. At the conclusion of Phase II, the Subcontractor shall operate the incineration system only for the purpose of conducting a trial burn in conjunction with the TBC at waste characteristics and feed rates at which a (Government, Contractor) approval will be sought. Stack emissions shall be sampled in accordance with the (Government, Contractor) approved trial burn plan including but not limited to sampling for the pollutants particulate matter, HCl gas, and principal organic hazardous constituents (POHCs) for the purpose of calculating the Destruction Removal Efficiency (DRE). Ash residues shall be analyzed for the organic priority pollutants, dioxins, furans, and PCBs (if applicable) set forth in the trial burn plan.

5. Upon completion of the trial burn, the incineration system may not burn any contaminated material (but may run utilizing fuel oil or natural gas for the purpose of preventing equipment damage) except under the following terms and conditions:

a. Upon written notification by the (Government, Contractor) that the analytical results for HCl and particulate matter derived from the trial burn

demonstrate compliance with the regulatory requirements of (XXX) DRE and (XXX) gr/dscuft respectively, the incineration system may operate and treat contaminated materials onsite in accordance with the waste characteristics and feed rates utilized during the trial burn and within the following operating parameters:

(1) Temperature in the exit of the secondary chamber equal to or greater than (XXX)°F.

(2) Oxygen concentration greater than (XXX).

(3) CO in the stack less than (XXX) ppm.

(4) Combustion Efficiency $\left(\frac{(CO_2)}{CO + CO_2} \times 100\right)$ of (XXX) or greater.

(5) Total hydrocarbons (HC) in the stack less than (XXX) ppm.

(6) Minimum residence time in the secondary chamber of (XXX) seconds.

(7) Waste feed shall cut off if any limit listed above is not complied with (XXX) second delay.

b. Analytical results for HCl and total suspended particulates (TSPs) shall be made available to the (Government, Contractor) in a form wherein compliance may be expeditiously ascertained.

c. Analytical results for organic analysis shall be delivered to the (Government, Contractor) within 30 days of the completion of the trial burn. In the event said results are not delivered with 30 days of completion of the trial burn, the Subcontractor shall cease operating the incineration system until such time as delivery to the Government is effected and the Government determines that the analysis demonstrates compliance with the

regulatory requirement of DRE equal to or greater than (XXX) or fails to make such a demonstration.

d. In the event the Government elects to require sampling for dioxins and furans pursuant to Subparagraph 8(c) below and such sampling causes a delay in the delivery of the analytical results for organic analysis beyond the 30-day delivery deadline set forth in Subparagraph 5(c) above, the Government shall have the option of either:

(1) Allowing the Subcontractor to continue operating on an interim basis in accordance with Subparagraph 5(a)(1-7) until such time as the organic analysis is delivered to the Government and the Government determines that the analysis demonstrates or fails to demonstrate compliance with the regulatory requirement of DRE equal to or greater than (specify 99.99XX%).

(2) The (Government, Contractor) shall pay to the Subcontractor the sum of ($XXX) per day, beginning on the 31st day following completion of the trial burn and continuing until the organic analysis is delivered to the (Government, Contractor), and the (Government, Contractor) determines that the analysis demonstrates or fails to demonstrate compliance with the regulatory requirement of DRE equal to or greater than (specify 99.99XX%).

e. Anything in this Subparagraph 5 to the contrary notwithstanding, the (Government, Contractor) reserves the right to direct the Subcontractor to cease operation after the initial trial burn until such time as all analytical results derived from the trial burn have been delivered to the (Government, Contractor), and the (Government, Contractor) determines that all regulatory requirements have been met. In the event the (Government, Contractor) shall exercise its right herein, the Government shall pay to the Subcontractor the sum of ($XXX) per day beginning on the day following completion of the trial burn and continuing until the regulatory agency issues a joint operating permit to the Contractor.

6. All official communication from the (Government, Contractor) relating to the trial burn and the approval or rejection of analytical data derived therefrom shall be issued through the (Government, Contractor) Project Coordinator. The Government shall endeavor to review the

analytical results that it receives from the trial burn(s) in a timely and expeditious manner.

7. a. In the event that pursuant to the trial burn referenced in Subparagraph V(5) above, the Government determines that the incineration system fails to demonstrate compliance with the requirements for HCl or particulate matter or organics (POHC DRE), the Subcontractor shall not operate the incineration system except to conduct subsequent complete trial burns in accordance with the trial burn plan and any necessary revisions thereto approved by the Government.

b. At the conclusion of the second or subsequent trial burns, no interim operation may be conducted. The Subcontractor shall only operate the incineration system pursuant to an operating permit from EPA, except for subsequent trial burns.

8. a. The Government shall reimburse the Subcontractor, up to ($100,000) for the costs and expenses the Subcontractor shall incur (including without limitation, the costs and expenses incurred by the Subcontractor in the payment of services rendered by the TBC) in connection with the initial complete trial burn.

b. All costs and expenses incurred by the Subcontractor in connection with the initial complete trial burn in excess of ($100,000) shall be born solely and exclusively by the (Government, Contractor) except as provided in Subparagraph 8(c) below.

c. The (Government, Contractor) reserves the right to require sampling for dioxins and furans in which event the (Government, Contractor) shall bear the additional costs associated with that analysis.

d. All costs and expenses incurred by the Subcontractor because of incineration system nonoperational time as a result of awaiting trial burn analytical results, awaiting the review of trial burn analytical results and approvals and disapprovals as a result of such review; delays occasioned by the failure of the incineration system to meet the regulatory requirements set forth in this Paragraph W; and time delays occasioned by awaiting initiation

of the initial or subsequent trial burns shall be borne solely and exclusively by the Subcontractor.

e. All costs and expenses associated with trial burns subsequent to the initial trial burn, trial burns conducted by the Subcontractor outside the scope of the (Government's, Contractor's) requirements, or trial burns regulatory agency may deem necessary due to changes in equipment shall be borne solely and exclusively by the Subcontractor.

W. ONSITE LABORATORY

The Subcontractor shall provide an onsite laboratory and shall institute all necessary and appropriate measures to ensure that the laboratory does not become contaminated during implementation of the work. In the event the Subcontractor is unable to maintain a contamination-free environment within the laboratory, the Subcontractor shall relocate the laboratory to an offsite location and shall conduct all subsequent requisite analysis at the offsite laboratory. The Subcontractor shall bear all of the costs related to the relocation of the laboratory and subsequent operation of the laboratory facility. In order to provide quality assurance, and to maintain quality control regarding all samples collected pursuant to this agreement, the Subcontractor shall ensure that all laboratory(ies) utilized by the Subcontractor for analyses (a) perform all analyses according to methods and good laboratory practices deemed satisfactory to the regulatory agency, and (b) participate in a quality assurance/quality control program in accordance with or comparable to EPA document QAMS-005/80.

The Subcontractor shall supply the (Government, Contractor) Site Coordinator with adequate office space at the Site.

X. RECORDKEEPING AND REPORTING

The Subcontractor shall maintain and provide legible copies of complete, detailed, and accurate records and reports of the services performed under this contract. All project records shall be subject to examination, audit, and approval by the (Government, Contractor) and the regulatory agency. These records and reports shall include, but not be limited to, the following:

1. Written summaries of progress at daily, weekly, or monthly intervals as specified by the (Government, Contractor). These summaries shall outline the work accomplished during the reporting period; work to be accomplished during the subsequent reporting period; problems, real or anticipated, that should be brought to the attention of the (Government, Contractor), and notification of any significant deviation from previously agreed upon work.

2. Daily field activity logs (process operators logs, excavation logs, sampling logs) shall be maintained and attached to the progress reports developed pursuant to Subparagraph X(1):

3. Other records and reports that may be required by local, state, and Federal regulatory agencies.

4. The Subcontractor shall provide a final report summarizing its activities and completed responsibilities for the Site cleanup and reclamation, along with any other pertinent documentation required by the Government.

5. All field activities shall be photographically documented. Unless otherwise specified by the (Government, Contractor), this documentation shall be in the form of slides with an explanatory text.

ATTACHMENT 1

AMENDED SCHEDULE OF PAYMENTS

		Quantity	Unit	Unit Price	Extension
1. Initial Activities		_____	--	$_____	$_____
2a.	Treatment of Contaminated Soil and Sludges	_____	Tons	_____	_____
2b.	Treatment of Contaminated Wastes in Drums	_____	Drums	_____	_____
2c.	Treatment of Contaminated Liquids in Tanks	_____	Gallons	_____	_____
2d.	Treatment of Contaminated Soils and Sludges	0	Tons	Required set up	
		1000	Tons	$_____	$_____
		2000	Tons	$_____	$_____
		3000	Tons	$_____	$_____
		4000	Tons	$_____	$_____
		5000	Tons	$_____	$_____
		6000	Tons	$_____	$_____
		7000	Tons	$_____	$_____